

[54] **PACKAGING SLEEVE WITH HEAT-SHRINKABLE PROTECTION SLING AND BLANK FOR PRODUCING SAME**

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[52] U.S. Cl. **229/14 BA**, 206/46 FR, 229/37 R, 229/DIG. 12

[51] Int. Cl. **B65d 5/58**, B65d 81/10, B65d 85/30

[58] Field of Search 229/37, 27, 14, 14 BA, 87 F, 229/DIG. 12; 206/78 B, 45.33

[56]

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UNITED STATES PATENTS

3,312,337	4/1967	Martin	206/46
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[57]

ABSTRACT

A tubular packaging sleeve and blank in which a heat-shrinkable membrane or sleeve is integrally incorporated in the blank construction, and after assembly of the blank and insertion of an article in an erected sleeve, the application of heat causes a protective sling to be intimately formed about the article and to suspend the article in protective relationship in a package.

6 Claims, 14 Drawing Figures

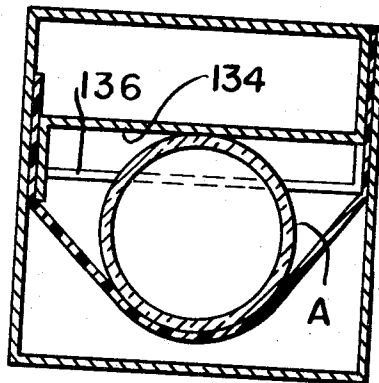


FIG. 4.

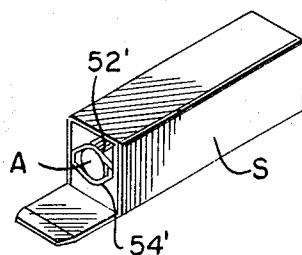


FIG. 1.

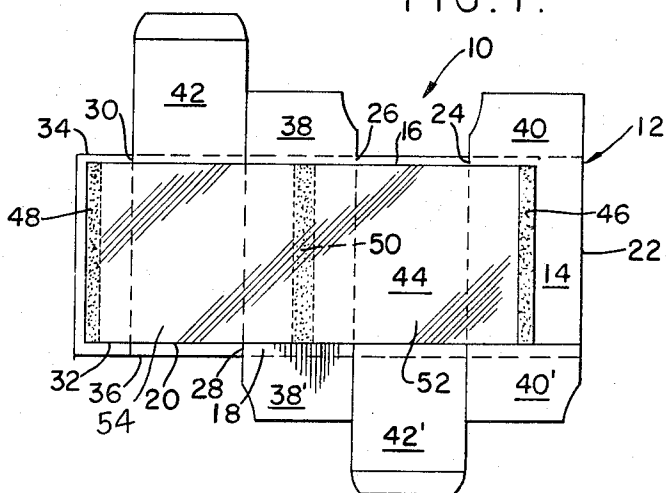


FIG. 2.

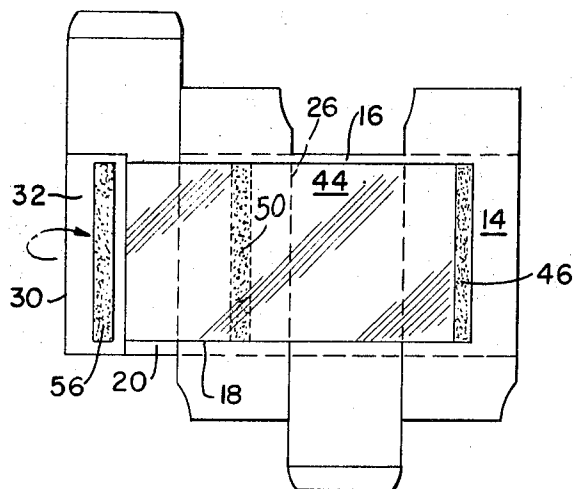


FIG. 3.

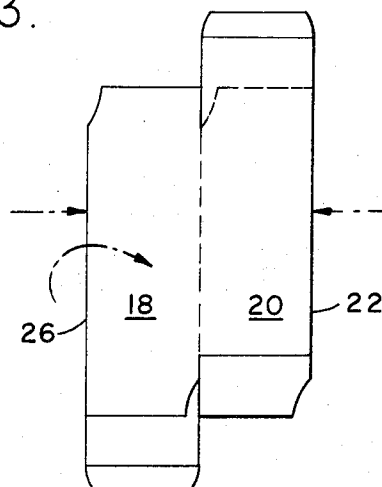


FIG. 5.

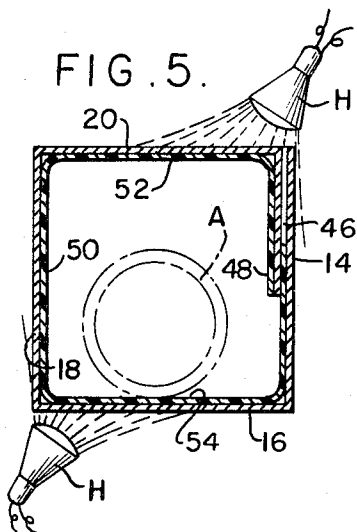
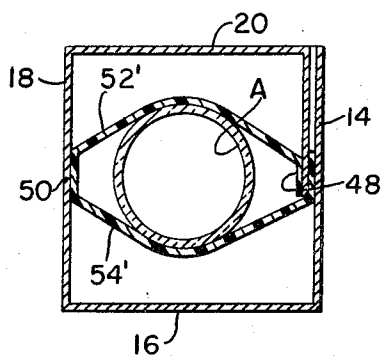


FIG. 6.



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FIG. 14.

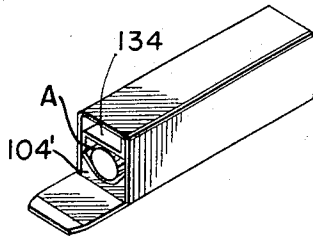


FIG. 7.

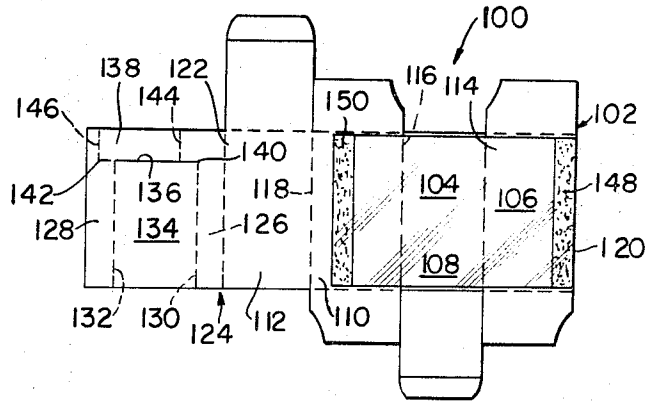


FIG. 8.

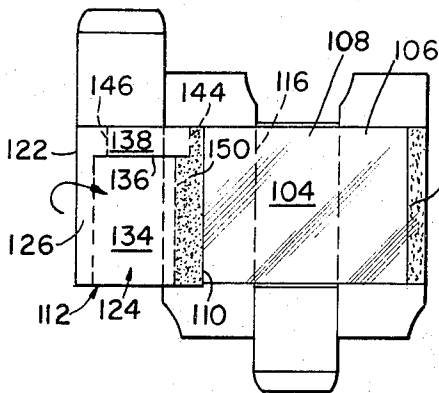


FIG. 9.

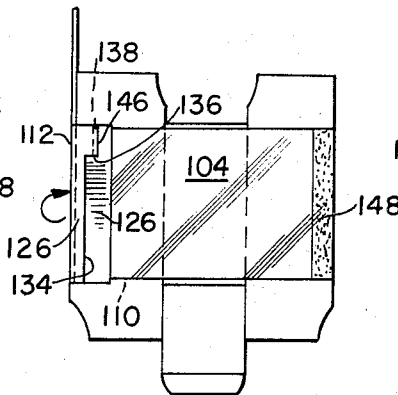


FIG. 10.

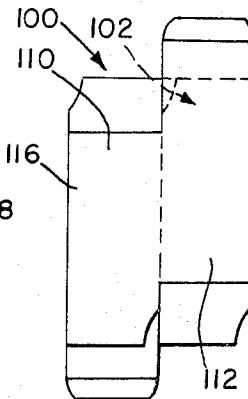


FIG. 11.

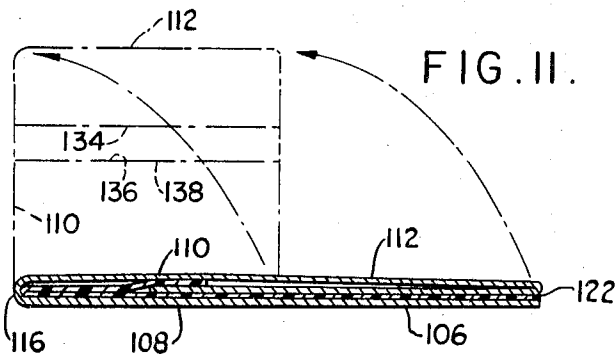


FIG. 13.

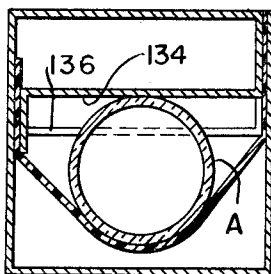
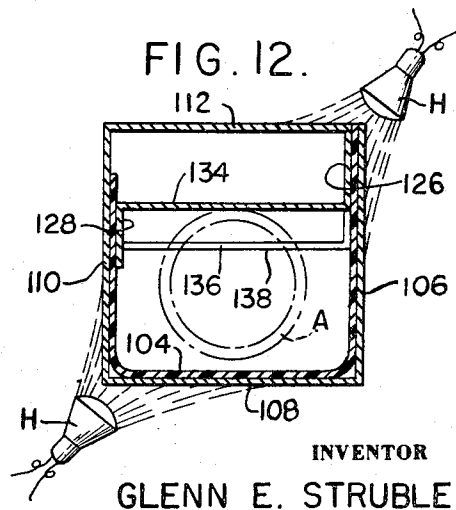


FIG. 12.



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DISCUSSION OF PRIOR ART

Fragile articles such as radio tubes, electronic components, etc. are subject to damage during handling and transit, and it is particularly important to protectively package such articles to avoid damage, malfunctioning, etc. Typical package sleeves of the character involved are illustrated, by way of example only, in the patents to Bates U.S. Pat. No. 2,893,623 or Smith U.S. Pat. No. 2,854,181. Other types of packages for fragile articles are illustrated, by way of example only, in the U.S. Pat. Nos. to Hoover 2,700,460, Ryno 2,700,518 and Lingenfelter 2,837,208. Additionally, the use of heat shrinkable films in packaging, is shown, by way of example only, in the U.S. Pat. Nos. to Martin 3,312,337, Peppler 3,248,842, or Henderson 2,890,552.

BACKGROUND OF THE INVENTION

Packaging sleeves must be readily produced, using minimal and inexpensive materials, and the blanks from which the packaging sleeves are produced should be adapted for use on conventional gluing and assembling apparatus, and further be capable of use on high-speed, loading and closing apparatus.

OBJECTS OF THE INVENTION

The primary objects of the present invention are to provide a tubular packaging sleeve having an integral heat-shrinkable membrane of biaxially oriented polyethylene or propylene, or the like, which packages are produced from a one-piece blank capable of use in high-speed assembling apparatus, and in which the heat-shrinkable membrane is automatically oriented into operative position when the assembled sleeve is erected and opened, and an article is automatically loaded into the sleeve prior to the application of heat through radiant heat lamps or blasts of hot air; the shrinking of the membrane forming a suspension sling intimately adapted to the contour of the article in the package, protectively suspended away from adjacent wall portions of the sleeve to prevent shock and damage during handling, storage and transit.

Another object of the present invention, in conformance with that set forth above, is to provide in a packaging sleeve of the character described an orienting step element functioning in combination with the heat-shrunk suspension sleeve.

These together with other objects and advantages will become apparent from a consideration of the following description when taken in conjunction with the drawings forming a part thereof, in which:

FIG. 1 is a plan view of a blank incorporating the invention;

FIG. 2 is a plan view, similar to FIG. 1, and showing a first fold during assembly of the blank;

FIG. 3 is a plan view similar to FIGS. 1 and 2 showing a final folding step during assembly of the blank;

FIG. 4 is a reduced perspective view of the assembled and erected packaging sleeve produced from the assembled blank of FIG. 3;

FIG. 5 is a transverse section, on an enlarged scale, showing the erected sleeve loaded with an article to be packaged, and illustrating by phantom lines radiant heat lamps;

FIG. 6 is a view similar to FIG. 5, showing a sling supporting an article after heat-shrinking per FIG. 5;

FIG. 7 is a plan view showing another blank incorporating another embodiment of the invention;

FIG. 8 is a plan view similar to FIG. 7 showing a first folding step during assembly of the blank;

FIG. 9 is a view illustrating the manner in which the assembled portions of FIG. 8 function during erection of the finally assembled blank;

FIG. 10 illustrates the final folding step to assemble the blank;

FIG. 11 is an enlarged section taken on line 11-11 of FIG. 10 and showing by phantom lines the manner by which the assembled, folded-flat blank is erected to form a tubular sleeve;

FIG. 12 is a transverse section showing the erected sleeve, on an enlarged scale, illustrating by phantom lines the position of an article to be packaged, and also illustrating by phantom line radiant heat lamps;

FIG. 13 is a section similar to FIG. 11, showing a sling formed about the article after heat is applied per FIG. 12; and FIG. 14 is a reduced scale, perspective view illustrating a package incorporating a sleeve according to FIG. 13.

Referring to the drawings in detail, first considering FIGS. 1-6; more particularly FIGS. 1-3, a blank for producing the protective sleeve or carton of FIG. 2 is indicated generally at 10 and is produced from any suitable paperboard, laminated paperboard, plastic and paperboard combination, etc. The blank 10 is produced from a one-piece paperboard construction 12 including rectangular wall panels 14, 16, 18, and 20 extending from a free-sided margin 22 and connected in series by fold or score lines 24, 26 and 28. The panel 20 includes a side margin 30 defined by a score or fold line to which is hingedly connected a glue flap panel 32. The upper and lower margins 34 and 36 are normal to the fold lines and edges 22-30 and have hingedly connected thereto closure flaps and a cover panel with a tuck flap indicated at 38, 40, 42 and 38', 40' and 42', respectively. A detailed description of the closure flaps and cover flaps will not be supplied inasmuch as this structure is generally conventional.

Overlying a portion of the wall panel 14, the panels 16, 18, 20 and a portion of the glue flap 32 is a relatively thin, heat-shrinkable sheet of plastic material 44 defining a membrane of biaxially oriented polyethylene or propylene, or the like which is applied to blank 12 on conventional apparatus and which extends substantially the length of the wall panels. The material 44 is terminally secured at glue areas 46 and 48 and to an intermediate portion of the panel 14 and adjacent the end of the glue flap 32. The intermediate portion of the membrane 44 is secured by a glue area or strip 50, and the intervening portions of the membrane 44 as indicated at 52 and 54 are free and loose from the adjacent underlying wall portions and can freely shrink inwardly in a manner to be described in detail.

Considering FIG. 2, the first fold is made at line 30 wherein flap 32 will overlie wall panel 20 and a glue area 56, formed on the outer surface of the glue flap 32, will be exposed as illustrated.

The next fold is made at fold line 26 in which panels 18 and 20 are pivoted in planar unison into overlying relationship with panels 14 and 16, respectively, and the glue area 56 will substantially overlie the glue area 46.

After the blank is assembled, as illustrated in FIG. 3, pressure at edges 22 and fold line 26 will result in erection of the sleeve to the condition shown in FIG. 5; see also heat-shrinkable segments 52 and 54 defined by the glue areas 48 and 50. An article A as illustrated by phantom lines can comprise a radio tube, transistor, or any comparable electronic component. The heat lamps H, when activated, will cause the segments 52 and 54 to shrink inwardly and intimately engage the article A defining reduced dimension segments 52' and 54', respectively, which suspend the article A away from the inner surfaces of the sleeve-forming walls. As illustrated in FIG. 4, after the membrane has been shrunk in the manner illustrated in FIG. 6, closure flaps and cover flap are "closed" in the usual manner. The article A will not generally extend the entire length of the protective sleeve to obviate damage due to accidental shock to the ends of the erected sleeve S.

Referring to FIGS. 7-14, and first considering FIG. 7, another embodiment of the invention comprises a blank 100 including a one-piece blank element 102 to which is secured a heat-shrinkable membrane 104. The blank 102 comprises wall panels 106-112 connected by vertical fold or score lines 114, 116, and 118 and the wall panel 106 includes a free margin 120. Hingedly connected to the side marginal score line 122 of wall panel 112 is a supplemental panel element 124 comprising a first glue flap segment 126 and a second glue flap segment 128 hingedly connected by mutually parallel hinge lines 130 and 132 to an intermediate partition panel 134. Separated from the panel 134 by a through-cut line 136 is an end panel

element 138 which terminates at the base of fold line 130, and which extends partially into the second glue segment 128 terminating at 142. The segment 138 is defined by mutually parallel segmental score lines 144 and 146 which are parallel and offset with respect to the score lines 130 and 132, respectively.

The upper and lower margins of the wall panels 106-112 and the supplemental panel 124 are co-extensive, and the heat-shrinkable membrane 104 extend substantially the length of the wall panels. Suitable closure flaps and cover flaps (the latter including a tuck flap) are hingedly connected to the upper and lower margins of the wall panels.

The heat-shrinkable membrane 104, as in the previously described embodiment, comprises a biaxially oriented polyethylene or propylene, or the like, and is terminally anchored by glue strip portions 148 and 150 defining an intermediate free heat-shrink portion completely overlying the inner surface of wall panel 108 and 106 and terminating immediately of the inner surface of the wall panel 110.

Considering FIG. 8, the first fold is made at fold line 122 wherein supplemental panel 124 is folded inwardly onto wall panel 112 and the glue flap 128 will overlie the glue area 150 of the heat-shrinkable membrane 104. Before completely assembling the blank, reference is directed to FIG. 9, and when the wall 112 is pivoted normal or at right angles to wall 110, the segments 138 of the supplemental panel 124 will pivot outwardly a greater distance than panel portion 134, thus exposing edge 136 in spaced relation from the plane of panel 134.

Referring to FIGS. 8 and 10, the next fold is made at fold line 116 wherein the wall panels 106 and 108 are folded as a planar unit in coplanar relation onto the panels 110 and 112, with supplemental panel 124 being in the position illustrated wherein the glue strip 148 overlies and is connected to the glue flap 126. The blank will be assembled in the folded flat condition corresponding to that shown in FIG. 3.

Referring to FIG. 11, when pressure is applied at the opposite fold lines 116 and 122, the assembled blank is erected as a rectangular cross-sectioned sleeve, and the partition panel 134 will be in spaced relation from the panel segment 138 exposing the edge 136. This relationship is more clearly illustrated in FIG. 12, for example, where the article A partially rests on the lip or step 136; it being noted that the heat-shrinkable membrane or film 104 is terminally anchored at the opposite sides of the partition panel 134 and extends in overlying relationship with respect to the step or support lip 136. The heat lamps H upon applying heat to the film 104 causes it to shrink and form a sling 104' intimately overlapping the article A and conforming to adjacent portions thereby urging the article into engaged relationship with the partition panel 134 as seen in FIG. 13.

In FIG. 14, the erected sleeve shrunk into a sling 104' is illustrated in relation to partition panel 134.

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown in the drawings and described in the specification.

What is claimed is:

1. A foldable-flat packaging sleeve comprising a plurality of

outer walls hingedly connected on mutually parallel fold lines for forming an erected sleeve with a polygonal cross section;

heat shrinkable membrane means secured to opposed inner surface portions of said wall for forming an integral sleeve with a through opening for receiving an article at either end of the erected sleeve, adhering to and generally suspending the article in the erected sleeve after the heat-shrinkable membrane means is shrunk; and

an auxiliary, foldable partition-panel hingedly connected between intermediate portions of a pair of opposed walls and in opposed relation to said heat-shrinkable membrane means.

2. The structure as claimed in claim 1 including a foldable step portion at one end of said auxiliary partition panel and projectable laterally inwardly of said partition panel and including a support edge spaced inwardly from said auxiliary panel for supporting one end of an article.

3. The structure as claimed in claim 2 in which said heat-shrinkable membrane means comprises a heat-shrinkable liner generally conforming to the inner surface of said outer walls and permitting ready insertion of an article into said sleeve, said liner being secured to intermediate portions of opposed walls.

4. The structure as claimed in claim 3 in which said liner extends substantially the length of the tubular sleeve.

5. The structure as claimed in claim 1 in which said liner conforms to a U-shaped section of said tubular sleeve extending from terminal ends to said partition panel and about confronting inner surfaces of said walls.

6. A blank for producing a foldable-flat packaging sleeve comprising in combination:

a plurality of wall panels defined by mutually parallel fold lines,

means for hingedly connecting marginal side edges of the wall panels to form a tubular packaging sleeve when the blank is assembled;

cover means connected to top and bottom edges of said wall panels; the improvement comprising:

a heat-shrinkable membrane overlying inner surfaces of said wall panels and including at least one intervening free heat-shrinkable panel portion defined by terminally anchored portions for forming a suspension sling with an article when the blank is assembled and the panel is heat-shrunk;

said heat-shrinkable membrane also being terminally anchored and including a single intermediate free heat-shrinkable portion extending from intermediate portions of alternate wall panels of the blank and completely overlies a wall panel therebetween; and

said blank further including a supplemental panel foldably connected to the wall panel remote from said membrane, said supplemental panel including from said wall panel to which it is connected a glue flap, partition panel, and supplemental glue flap all connected on mutually parallel fold lines,

and a step panel having a free edge bordering said partition panel and hinged to fold lines offset and parallel to the fold lines of said glue flaps and partition panel.

* * * * *