Aug. 22, 1967 R. A. COTE 3,337,033

CARTON

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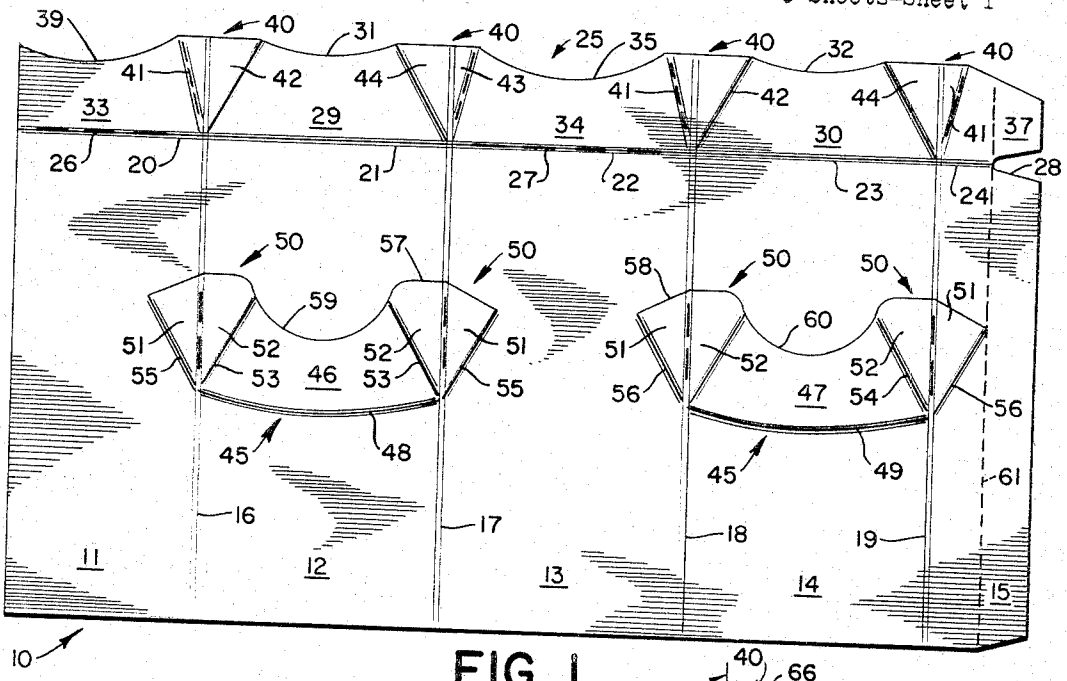


FIG. 1

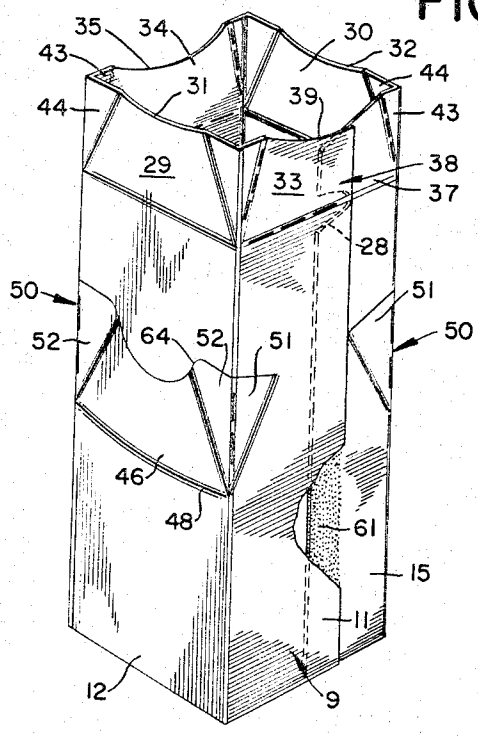


FIG. 2

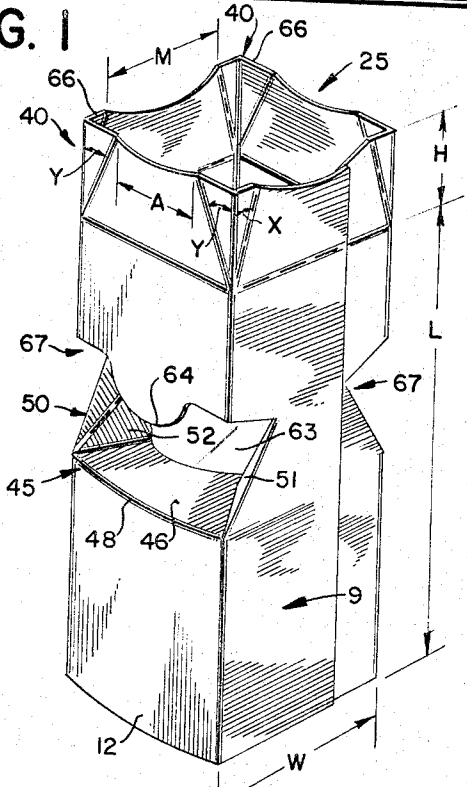


FIG. 3

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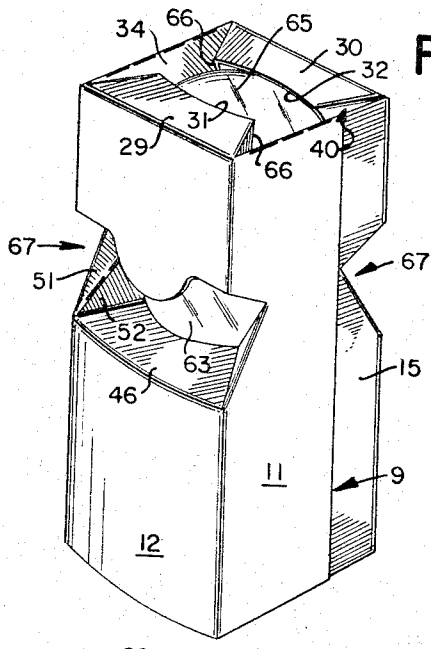
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FIG. 4



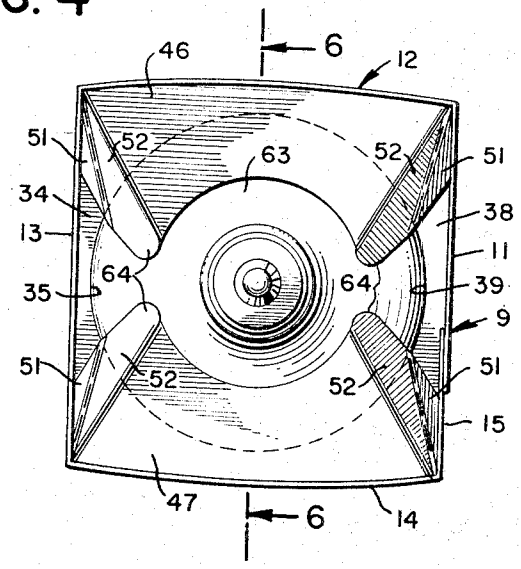


FIG. 5

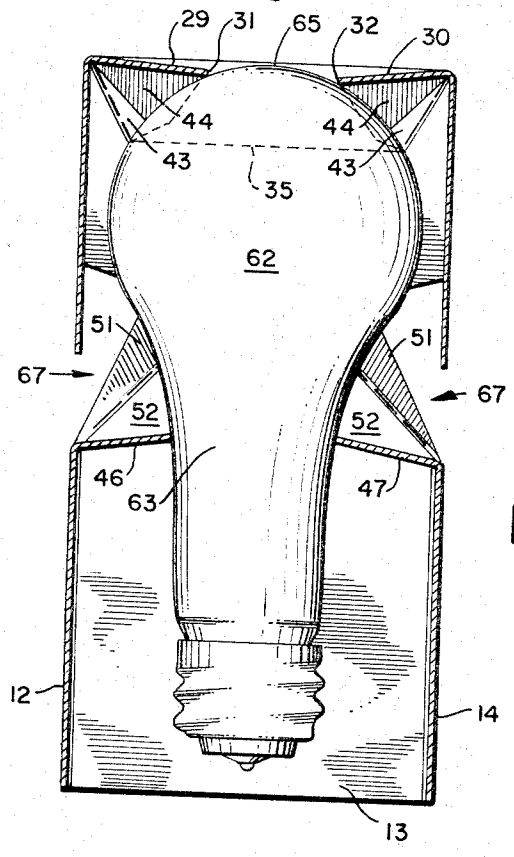


FIG. 6

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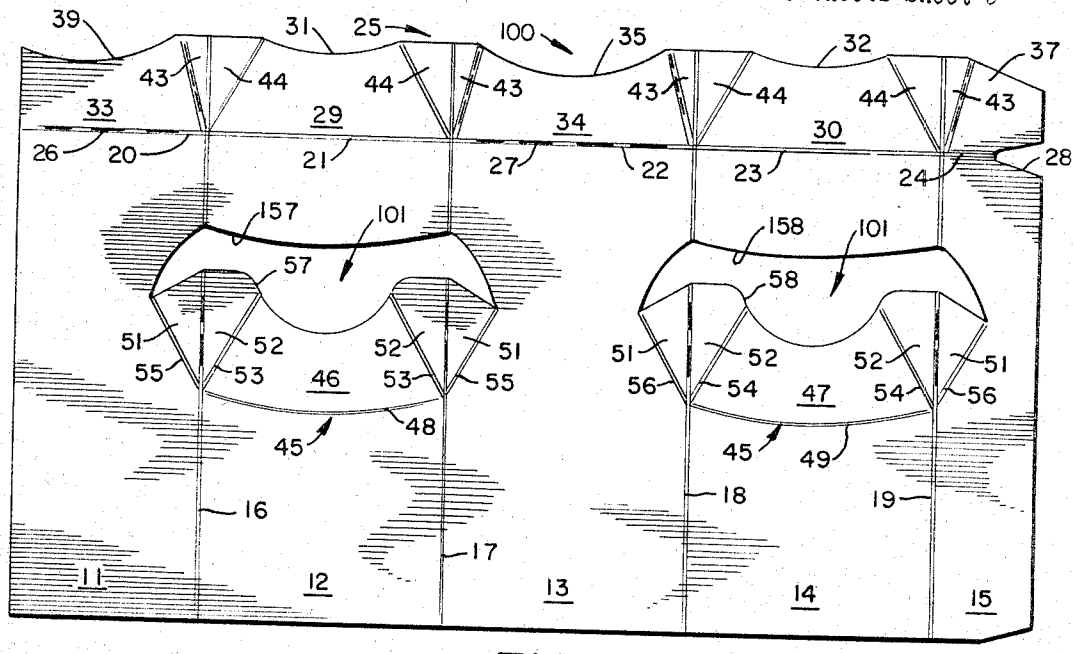


FIG. 7

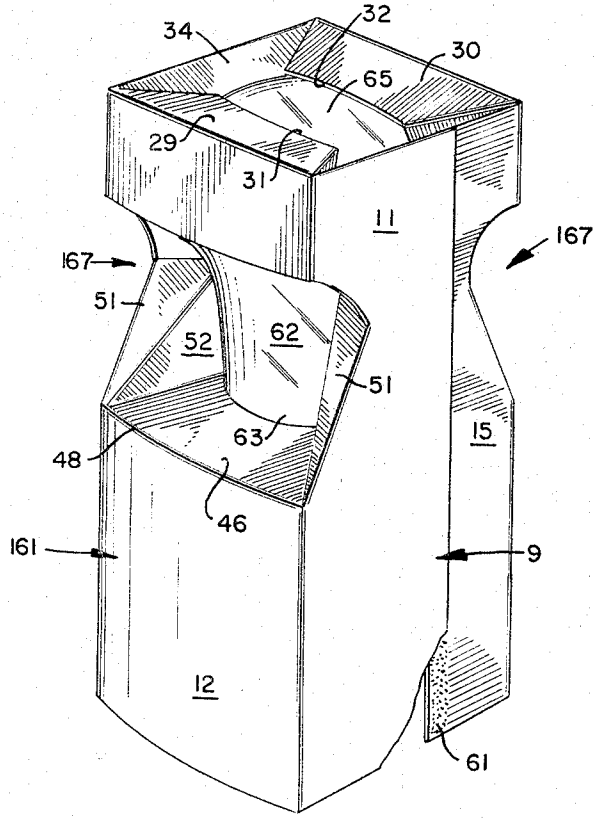


FIG. 8

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United States Patent Office 3,337,033 Patented Aug. 22, 1967

3,337,033

CARTON

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Filed Mar. 22, 1965, Ser. No. 441,463
4 Claims. (Cl. 206—45.14)

ABSTRACT OF THE DISCLOSURE

A non-condensable display carton in the form of a sleeve of fixed length which includes a biasing structure formed by extensions of the upper end of the sleeve and a pair of yoke-like article support means intermediate the open ends of the sleeve extending inwardly from opposite walls.

The present invention relates to the packaging of light bulbs and more particularly to a new and improved paperboard carton having opposed resilient article-supporting structures disposed in a tubular sleeve in a manner providing substantial display of the article to be packaged.

Specifically, the carton of the invention cushions a light bulb or other like fragile article in a tubular sleeve between new and improved, longitudinally spaced biasing structures which tend to urge the article in opposite directions and therefore, in effect, to clamp the article therebetween. In the new carton, a yoke structure, comprising a pair of upwardly acting biasing platforms, supportingly engages lower portions of the light bulb and tends to urge the bulb upwardly of the carton, while a downwardly and inwardly acting biasing structure supportingly engages upper portions of the light bulb and tends to urge the bulb downwardly and inwardly of the carton. In accordance with the invention, the desired biasing effects of the bulb-supporting structures are derived from their specific folded configurations which utilize and cooperate with the natural resilience of the paperboard to achieve spring-like characteristics. Moreover, when erected, the biasing structures, themselves, act to rigidify the overall carton structure and to enhance its resistance to crushing.

For a more complete understanding of the present invention and its attendant advantages, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a plan view of a blank from which a carton embodying the principles of the present invention may be subsequently erected;

FIGS. 2–4 are perspective views of a squared tube formed from the blank of FIG. 1 showing the carton of the invention in consecutive stages of erection and loading;

FIG. 5 is a bottom plan view of the carton of the invention showing biasing support of a light bulb by the new and improved yoke structure;

FIG. 6 is a cross-sectional view of the carton of the invention taken along line 6—6 of FIG. 5;

FIG. 7 is a plan view of a blank for an alternate embodiment of the invention in which a display window of increased size is provided; and

FIG. 8 is a perspective view of a carton erected from the blank of FIG. 7.

Referring to the drawings and initially to FIG. 1, the carton of the invention may be formed from a generally rectangular blank 10 cut and scored to provide a first side wall 11, a front wall 12, a second side wall 13, a rear wall 14, and a glue flap 15, consecutively articulated along transverse score lines 16–19, respectively.

The blank 10 includes a top biasing structure 25 hinged to the aforementioned panels along a transverse line of weakness defined by consecutive, linear score line segments 20–24, two of which segments 20, 22 are further weakened by the superimposition of spaced cuts 26, 27, respectively. The score line segment 24 terminates in a notch 28 formed in the glue flap 15. In accordance with the invention, the top biasing structure 25 is formed from two pairs of generally trapezoidal bulb-supporting panels hinged to the upper edges of the wall panels and interconnected by bellows 40.

As shown, a first pair of bulb-supporting panels, designated as "automatic" trapezoidal panels, includes a trapezoidal panel 29, hingedly connected to the front wall panel 12 along its base defined by score line 21, and a similar trapezoidal panel 30 hingedly connected to the rear wall panel 14. The free edges 31, 32 of the automatic panels 29, 30 are concavely shaped, as shown, to provide uniform and complete engagement with spherical surfaces of a light bulb, as will be described in more detail.

A second pair of bulb-engaging panels, 33, 34 are hinged to the side wall panels 11, 13, respectively, along lines of weakness 20, 22. The panel 34 is generally trapezoidal in shape and is slightly larger than the automatic panels 29, 30, having a base width equal to the automatic panels, but having an upper edge 35 longer than the edges 31, 32 of the automatic panels. The panel 33 is not identical to the companion panel 34. However, a panel segment 37 is articulated to the glue flap 15 along the score line 24 and is adapted to be suitably adhered by a strip of adhesive 61 to the panel 33, as shown in FIG. 2, to combine therewith in the formation of a composite trapezoidal panel 38 similar in all other respects to the panel 34. For purposes of clear description, the generally trapezoidal panels 33, 38 will be designated hereinafter as "manual" trapezoidal panels.

The free edges 35, 39 of the manual panels are concavely shaped for subsequent engagement with a light bulb. As shown, the concavity or depth of the curve of the edges 35, 39 is greater than that of the free edges 31, 32 of the automatic panels, since the edges of the trapezoidal panels subsequently engage the bulb in different planes in which the bulb has different transverse sections.

In accordance with the principles of the invention, the aforementioned automatic and manual trapezoidal panels are interconnected by upper bellows 40 which are appropriately defined by lines of weakness 41 and 42 (defining the side edges of the trapezoidal panels) and by the aforementioned transverse score lines 16–19. Accordingly, each of the upper bellows structures comprises a small gusset flap 43 and a large gusset flap 44. To facilitate infolding of the bellows 40 in the formation of the top biasing structure during carton erection, the score lines 41 are further weakened by cuts.

Formed within the walls of the blank 10 is a lower biasing structure 45 which includes platform panels 46, 47 of similar configuration hingedly disposed in the front and rear walls 12 and 14, along arcuate score lines 48, 49. In accordance with the invention, lower bellows structures 50, including pairs of gusset flaps 51, 52 formed on alternate sides of the score lines 16–19, are hinged to the platform panels 46, 47 along score lines 53, 54, respectively, and to the side wall panels along score lines 55, 56, respectively. Continuous cuts 57, 58 extending across the front and rear walls and into the adjacent side walls, free the upper edges of the bellows structures 50 and the platform panels 46, 47 from the remainder of the blank 10. The central portions 59, 60 of the cut scores 57, 58 are substantially circular or yoke-like in configuration in general conformance with the transverse section of a neck of a light bulb to be packaged, as will be understood.

In a typical representative embodiment of the carton or packaging a so-called "three-way" light bulb **62**, having a spherical upper portion **65** of approximately 2¼ inches diameter, a cylindrical neck portion **63** of approximately 1⅛ inches diameter, and an overall length of approximately 5¼ inches, the length L of each of the walls of the carton is approximately 5⅜ inches, while the width W of each of the walls is approximately 2¾ inches (FIG. 3). The height H of each of the overall trapezoidal panels of the biasing structure and the interconnecting gusset flaps **43**, **44** is approximately 1⅛ inches, while the projected length M (i.e., the length between the termini of the score lines **41**) of the free edge of each of the manual panels is approximately 2⅛ inches, while the projected length A (i.e., the length between the termini of the score lines **42**) of the free edge of each of the automatic panels is approximately 1⅜ inches. In the upper bellows **40**, the score lines **41** and **16–19** forming the gusset flaps **43** define angles X of approximately 18°, while the score lines **42** and **16–19** forming the gusset flaps **44** define less acute angles Y of approximately 31.°.

Formation and filling of the carton of the invention is extremely simple and may be accomplished with expedience as follows: The blank **10** is initially formed into a closed, collapsed tube by overlapping and adhering the glue flap **15** and the panel segment **37**, respectively, with the first side wall panel **11** and the panel **33**, as shown in FIG. 2, to define a composite side wall **9** similar in all respects to the second side wall **13** and a composite trapezoidal panel **38** similar in all respects to the manual panel **34**. This, of course, may be conventionally accomplished by folding the blank along two of the transverse score lines (e.g., **16**, **18**). It should be noted that, for easy and reliable folding, the composite panel **38** has only a single thickness of paperboard along its line of hinging to the side wall **9**, since the notch **28** extends for the width of overlap as generally defined by the width of adhesive **61**. As will readily be appreciated, flattened tubes may be stored or shipped in a minimum of space.

The carton of the invention may be finally erected and filled by squaring the collapsed tube into an open sleeve as shown in FIG. 2, in which the platform panels **46**, **47** and the top biasing structure **25** are disposed in the planes of the side walls of the container. Inward depression of the platform panels **46**, **47** will cause them to be inwardly hinged from the front and rear walls **12**, **14** and to be suspended from the side walls **9**, **13** along the score lines **55**, **56** by the lower bellows, as shown clearly in FIG. 3. As an important aspect of the invention, the geometry and arrangement of the lower bellows **50**, particularly the convergence of score lines **56**, **54** and **55**, **53** are such that the bellows are not fully expanded and cooperate with the natural resilience of the paperboard to provide sufficient "spring" to the platform to accommodate slight deflections thereof and to continuously urge the platform panels **46** upwardly. Moreover, the bellows **50** are advantageously arranged to maintain the inward fold of the platform panels at less than 90°, as shown best in FIG. 6. In the representative embodiment, the included angles Z of the scores **53**, **55** and **16–19** are approximately 30°.

Thereafter the light bulb **62** may be inserted through the open top of the carton and into engagement with the platforms **46**, as shown in FIGS. 5 and 6, for example, in which position the neck **63** of the light bulb is firmly supported by the opposed arcuate yoke surfaces **59**, **60** of each of the platforms and by the rounded free edges **64** of the innermost lower bellows panels **52**. In the representative embodiment used to package the bulb **62**, the platform panels, when erected, form a yoke of approximately 1⅜ inches in diameter which engages the neck **63** of the bulb at portions thereof where the relatively small neck diameter gradually increases or flares into the larger diameter spherical portions **65**.

The carton may be finally "closed" and the bulb **62** firmly cushioned therein by inwardly folding the manual panels **34**, **38** substantially more than 90°, but less than 180°, thereby causing the other trapezoidal panels **29**, **30** to be automatically drawn down slightly more than 90° and into resilient engagement with the top surfaces **65** of the light bulb **62**, as shown in FIG. 4, by the bellows connections **40** between the manual and automatic flaps. In this manner, the top portions of the bulb **65** will be firmly engaged in an uppermost plane by the arcuate edges **31**, **32** of the automatic panels (FIG. 4), in a lower plane by the arcuate edges **35**, **39** of the manual flaps (FIG. 5), and in planes intermediate said uppermost and lower planes by the free edges **66** of the upper bellows **40**. As an important aspect of the invention, the infolded top biasing structure has an inherent resilience or spring effect which tends to urge the bulb downward in opposition to the biasing of the platforms **46**, **47**.

More specifically, as the folding of the manual panels **34**, **38** is commenced, the resilience of the paperboard and the nature of the bellows connections **40** tend to resist the inward movement of the panels and to spring them back into their vertical positions (FIGS. 2 and 3). However, continued inward folding of the manual panels over and past the top of the bulb tends to "overcenter" and to draw the automatic panels below the top of the carton into recessed engagement with upper portions of the bulb. In accordance with the invention, the manual panels are appropriately proportioned to have a predetermined "interference fit" with the spherical bulb surface. That is to say, the edges **35**, **39** of the manual panels are lightly forced over the bulb surface in the "closure" of the carton and are held in their infolded positions (FIGS. 4 and 6) by the curvature of the bulb, the dimensions of which block the return or upward folding of the manual panels. As the degree of infolding of the manual panels increases and approaches 180° (i.e., the manual panels approach the planes of the side walls **9**, **13**) the automatic panels are drawn further inwardly of the top of the carton and thereby exert an increased downward holding force on the bulb. In this manner, the top biasing structure tends to be self-locking, since an upward axial movement of the bulb would tend to displace the manual panels toward the side walls, thereby increasing the downward infolding of the automatic panels in opposition to the direction of bulb displacement.

Thus, in accordance with the inventive principles, the bulb **62** or other packaged article is firmly gripped completely around its circumference in a multitude of planes by spring-like structures exerting opposing clamping forces thereupon. Moreover, the opposition of the holding forces is directed along both longitudinal and transverse axes of the bulb due to the mutual opposition of the platform panels, the mutual opposition of the automatic and manual panels, and the opposition of the upper and lower biasing structures **25**, **45**, themselves.

As another important aspect of the invention, the formation of the lower biasing structures **45** provides two windows **67** extending completely across the front and rear walls **12**, **14** and into the side walls **9**, **13**, which windows provide unusually effective display of the packaged bulb and may be perhaps best characterized as "wrap-around" windows. Furthermore, the infolding of the platform panels **46**, **47** along the arcuate score lines **48**, **49** tends to bow the front and rear walls of the carton into convex shapes, thereby enhancing the overall appearance of the carton. It should be understood that if flat front and rear walls are desired, the score lines **48**, **49** will be straight rather than arcuate.

In some applications, the area of product display may be substantially increased by removing portions of paperboard adjacent the platform panels **46**, **47** and lower bellows **50** without compromising the rigidity of the carton. An alternate embodiment of the invention showing this type of construction is shown in FIGS. 7 and 8,

where, for convenience, elements common to the above-described preferred embodiment have been identified with corresponding reference numerals. Thus, as will be apparent, a blank **100** for the alternate embodiment is substantially identical to the blank **10** with the exception of cutout window portions **101** formed adjacent the platform panels and lower bellows structures, which cutouts are defined by cuts **57**, **58**, **157**, **158** extending arcuately across the front and rear walls and into the side walls.

Formation and filling of the alternate embodiment of the invention may be accomplished as described hereinabove to provide a carton **161** having a wrap-around window **167** providing additional display of the bulb **62**. As will be appreciated, cartons embodying the principles of the present invention will provide an extremely high degree of cushioning and support for fragile articles with a relatively simple construction, which may be easily and economically manufactured from one-piece paperboard blanks. Furthermore, the new and improved construction is highly crush-resistant, attractive in appearance, and provides ample display of the packaged contents.

The new carton is especially well suited for packaging fragile light bulbs, since the new and improved upper and lower biasing structures engage the bulb through 360° of its periphery and at a multiplicity of planes from its narrow, lower, neck portions to its broader, upper spherical portions. The safety and reliability of the packaging is established not only by the great extent of bulb engagement, but by the spring-like manner in which the bulb is clamped between the upper and lower biasing structures. As should be understood, the spring-like effects of the biasing structures contribute to the efficacy of the invention and result directly from the specific configurations and interrelationships of the bellows and panels, which, themselves, are arranged to utilize the natural resilience of the paperboard.

While the present invention has been representatively described in terms of a specific, preferred embodiment especially well suited for packaging light bulbs, it is to be understood that certain variations and modifications thereof, within the scope of the inventive principles, will be apparent to those skilled in the art for packaging other articles. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

I claim:

1. A non-condensable display carton for a light bulb or like fragile article, comprising

(a) an open ended tubular sleeve of fixed length including consecutively articulated front, first side, rear, and second side walls;

(b) a biasing structure including four consecutively articulated extensions of said side walls reversibly hingedly connected to the upper edges of said walls;

(c) said extensions being adapted to be folded completely below said upper edges to engage an article being packaged in said carton;

(d) a pair of yoke-like article support means disposed intermediately of the open ends of said sleeve;

(e) said yoke-like means being derived from and articulated to opposite walls of said sleeve;

(f) said yoke-like means being adapted to be folded inwardly of said walls toward one another to engage an article being packaged and to define window portions in each of said walls;

(g) whereby said biasing structure and said yoke-like means are adapted to cooperatively support and to cushion an article between the open ends of said sleeve.

2. A carton in accordance with claim **1**, in which

(a) said extensions include first and second pairs of generally trapezoidal panels hinged to said walls;

(b) said first pair of trapezoidal panels have upper article engaging edges of first predetermined length;

(c) said second pair of trapezoidal panels have upper article engaging edges of a second predetermined length greater than said first length;

(d) upper bellows means interconnecting said first and second pairs of trapezoidal panels;

(e) said upper bellows means include four pairs of dissimilar gusset elements hinged to one another along score lines colinear with corner creases of said sleeve.

3. The carton of claim **2**, in which

(a) the free edges of said trapezoidal panels are of a predetermined configuration in general conformance with the shape of the surface of the article to be supported.

4. A carton in accordance with claim **1**, in which

(a) said yoke-like article support means include generally trapezoidal platform panels hinged to said front and rear walls;

(b) lower bellows means are hingedly connected to said platform panels and said side walls; and

(c) free edges of said platform panels define article engaging surfaces.

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