Feb. 28, 1967 A. B. STOREY 3,306,439

CARTONS

Filed Nov. 13, 1964

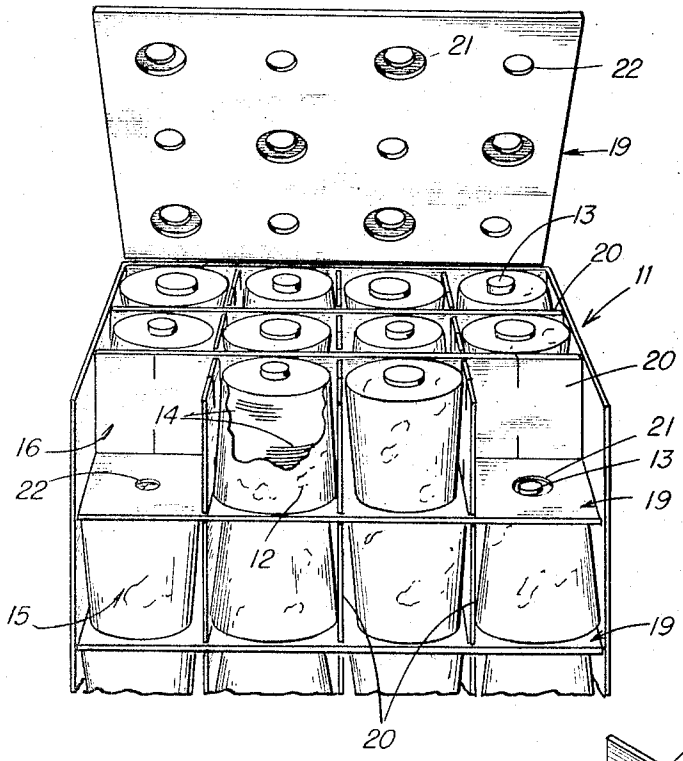


FIGURE 1

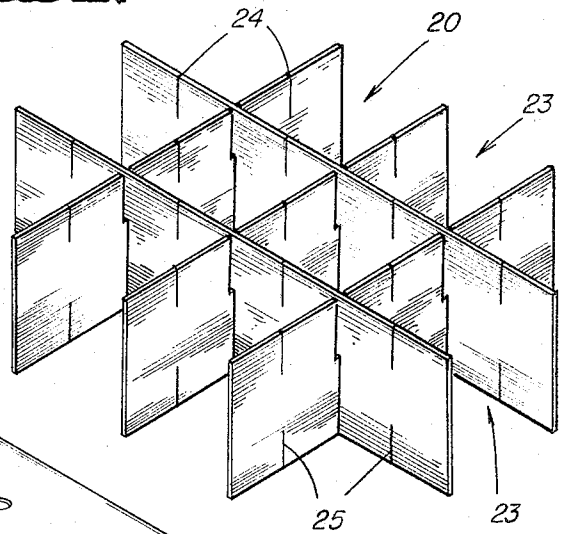


FIGURE 3

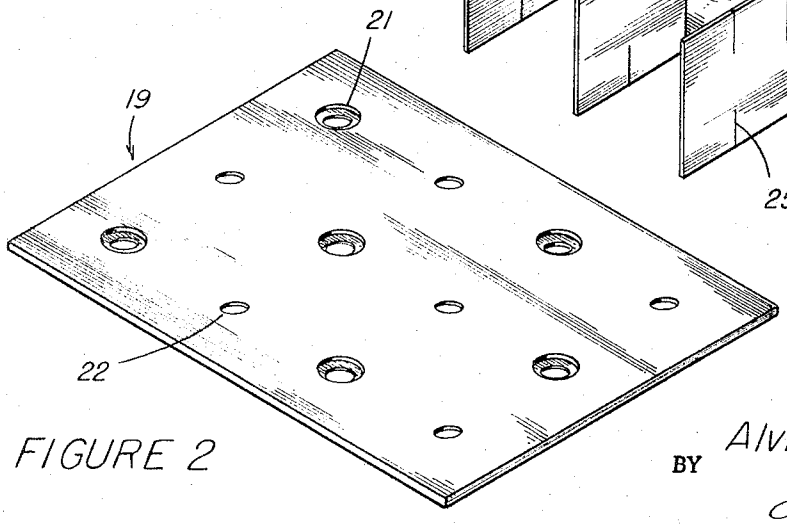


FIGURE 2

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This invention relates to cartons and relates more particularly to cartons for the storing and shipping of packages of yarn.

A great portion of the yarn produced in the textile industry is wound onto conical packages. The windings on these conical packages are so positioned that the ends of the conical support extend beyond the yarn windings. During the storing and shipping of these packages of yarn, they are rigidly supported to prevent them from rubbing against each other or against the walls of the carton in which they are enclosed, since such rubbing would mar at least the outer layers of yarn on said packages. One of the methods utilized to overcome this problem is to utilize cartons which contain apertured inserts for engaging the yarn packages separately so as to prevent movement thereof and damage to the yarn wound thereon. Although satisfactory results can be obtained utilizing this technique, the amount of net yarn poundage per cubic foot is drastically reduced. It would be highly desirable not only to increase the yarn package density but also to significantly improve the protection of the yarn package from handling.

It is the object of this invention to provide a carton for storing and shipping conical packages of yarn which will not only provide an increase in net yarn pounds per cubic foot but also provide improved protection for the yarn packages on handling. This and other objects will become apparent to those skilled in the art from the following detailed description and claims.

According to the present invention, there is provided a carton which will engage the packages of yarn so as to hold them against relative movement and prevent them from rubbing against each other or against the carton in which they are contained and which will also cushion said packages so as to prevent the transmittal of damaging shocks thereto. The carton of this invention includes a plurality of superimposed layers of conical packages of yarn wherein the layers are separated by pads which contain apertures of alternating size, i.e. if the initial aperture is for receiving and engaging the base of the conical package, then the following aperture is for receiving and engaging the opposite end or tip of said conical package and vice versa. It should be readily apparent that under these conditions every other conical package is inverted which is a distinct advantage since the conical package has a tapered effect thereby meshing the narrow and broad shapes of the adjoining packages to provide an increased package density or an increased amount of net yarn poundage per cubic foot in a limited space area. The pad in the adjoining superimposed layer contains alternating aperatures on the lower side to receive and engage the projecting ends of the conical packages contained on the lower adjoining pad. The upper side of the upper adjoining pad contains apertures of alternating size to receive and engage the base and tip end of the conical packages; but, in this instance, when the tip end of the conical package is engaged on the lower side of the upper pad, the tip end of the conical package

on the next layer will coincide with the same aperture on the upper side of the upper pad. In other words, the corresponding apertures of the pads in the superimposed layers will always contain the arrangement of base holes to tip holes or vice versa in the same layer and in the vertical position, and the upper layer conical packages will be placed in a tip-to-tip or base-to-base relationship as the case may be with the lower layer conical packages. These apertures are arranged in such a manner that a minimum amount of space will separate the conical packages when placed in position.

The space between the conical packages will be filled by appropriate special type cell-walled partitions which are spaced vertically one above the other on the pads. Normally, wall separators for yarn packages are rigid and vertical and do provide some protection for the packages when contained in the carton in the standard placement form when the alternate packages are not inverted. In the carton of this invention, every other conical package on one layer is inverted and the standard rigid and vertical wall separators would not be appropriate since they would require increased space for use since they are not flexible. To overcome this difficulty and for use in the carton of this invention, each wall within the partition of the cell-walled compartments contains a partial slit in a vertical direction from the top edge of each wall and a partial slit in a vertical direction from the bottom edge of each wall. These partial slits are of a suitable length to provide flexibility of the wall and permit a desirable snug fit of the packages within the individual compartments. The significance of the flexibility of the compartment walls is to permit each wall to conform readily to conical shaped yarn packages. The flexibility feature of the wall in combination with the placement of the packages has significantly improved the cushioning effect of the yarn packages during handling and transportation in a great degree by virtue of the yielding effect of slit partitions.

A preferred embodiment of this invention of a carton for storing and shipping conical packages of yarn with reference to the accompanying drawings wherein:

FIGURE 1 is a fragmentary perspective view of the carton showing the arrangement of the conical packages of yarn;

FIGURE 2 is a representation of a pad containing apertures of alternating sizes utilized in between the conical package yarn layers;

FIGURE 3 is a representation of the cell-walled portion utilized to support the individual yarn packages.

Referring now to the drawing of FIGURE 1, the numeral **11** designates generally the protective cover of a carton which may be formed from corrugated board, corrugated fiber board or other suitable material as may all the parts of the carton, and in which is contained a plurality of conical yarn packages **12** wrapped in paper comprising tubular supports **13** of conical shape having thereon yarn windings **14**. The conical yarn packages **12** are arranged in superimposed layers **15** and **16**, each of which layers is supported on a pad indicated generally by the reference numeral **19** and further described in FIGURE 2. Each of the conical yarn packages **12** are maintained in place by a cell-walled partition identified generally as **20** and, more fully described in FIGURE 3.

FIGURE 2 indicates a pad **19** having apertures of

alternating sizes wherein aperture 21 supports a base of the conical yarn package and aperture 22 supports the nose end of the yarn package. The underside of the pad 19 is demonstrated in FIGURE 1.

FIGURE 3 indicates cell-walled partitions 20 as identified in FIGURE 1. The partition 20 is made up of individual cells containing walls 23 having partial slits 24 in a vertical direction from the top edge of each wall 23 and partial slits 25 in a vertical direction from the bottom edge of each wall 23. FIGURE 3 indicates a preferred partition 20 used in this invention wherein partial slits 24 and 25 are centered in the walls of the partition.

A comparative demonstration indicates the improvements of the cartons of this invention over known procedures for packing. In utilizing the cartons of this invention, 4-pound conical packages of "A" yarn quality were individually wrapped in wax paper and packed in alternating pattern of base and tip nested in corrugated partitions as shown in FIGURE 1. Each container, holding 72 cones in 6 layers, was compressed to approximately one inch below pack before applying two steel straps to level pack. For comparative purposes, a standard container was packed with 72 cones in 6 layers of 4-pound conical packages containing "A" quality yarn wherein the cones were wrapped in wax paper and placed in the identical position throughout (no inverted cones) and utilizing a folder containing 3 apertures per folder in the top and bottom of the folder for the tips and bases of the conical package yarns and providing a rigid partition between the adjoining group of package yarns. This container was enclosed utilizing two steel straps.

Each container was subjected to 2-hour vibration tests at 1 G. (G indicates acceleration or deceleration at the same rate as acceleration due to gravity.)

Each container was given a pushover fall before being cycled on the Conbur impact tester. The pattern of this test was as follows:

(1) One impact against all panels.

(2) Two diagonal impacts against bottom and top panel edges. Angle of impact determined by a line parallel with direction of impact, intersecting opposite top and bottom corners.

All tests run at full impact velocity calibrated as duplicate of approximately 19 inches free fall.

Following rough handling tests the containers were inspected for outward physical damage. Containers were then reopened and cones examined as to location and severity of damage. Grading of coned yarn was in accordance with established "A" quality standards.

INSPECTION RESULTS—ROUGH HANDLING TESTS, 4-POUND CONED YARN

[Damaged tube bases, transfer tails and bruised yarn]

Layer	Damage	Invention Container (216 cones), Bruised Yarn—Die-Cut Pads and Partitions		Standard Container (216 cones), Damaged Tubes and Transfer Tails—Folders	
		No.	Percent	No.	Percent
6	Slight	5	2.3	13	6.0
	Moderate	0	0	9	4.2
	Severe	0	0	2	0.9
5	Slight	2	0.9	10	4.6
	Moderate	0	0	1	0.5
	Severe	0	0	3	1.4
4	Slight	1	0.5	7	3.2
	Moderate	0	0	4	1.8
	Severe	0	0	0	0
3	Slight	2	0.9	5	2.3
	Moderate	0	0	0	0
	Severe	0	0	1	0.5
2	Slight	2	0.9	1	0.5
	Moderate	0	0	2	0.9
	Severe	0	0	0	0
1	Slight	4	1.9	4	1.8
	Moderate	0	0	7	3.2
	Severe	0	0	12	5.5
	Total	16	7.4	81	37.4

CONDENSED TABULATION BY SEVERITY

	Bruised yarn		Damaged tubes and transfer tails	
	No.	Percent	No.	Percent
Slight	16	7.4	40	18.5
Moderate	0	0	23	10.6
Severe	0	0	18	8.3
	16	7.4	81	37.4

Bruised yarn:
Slight—Removal of several outer windings of yarn would eliminate bruished yarn area.
Moderate—None found.
Severe—None found.
Damaged tubes and transfer tails:
Slight—Detectable damage, but would not interfere with yarn transfer.
Moderate—Borderline, may or may not interfere with yarn transfer.
Severe—Definite interference with yarn transfer.

I. Rough handling tests, 4-pound coned yarn—

(A) Vibration tests, one container each:

(1) Standard container—No evidence of damage to cone tubes and yarn.

(2) Invention containers—No evidence of damage to cone tubes and yarn.

(B) Incline impact and related pushover tests, three containers each:

(1) Standard containers—From 216 cones evaluated 81 or 37.4 percent contained damage to either tube bases or transfer tails. Of this amount 18.9 percent was considered detrimental to subsequent processing.

(2) Invention containers—From 216 cones evaluated 16 or 7.4 percent contained slightly bruised areas. Of this number 12 or 5.5 percent were within "A" quality standards. The remaining four cones or 1.9 percent could be reclassified as "A" quality after removal of several outside layers.

Superiority of the invention containers to protect yarn packages is confirmed by the above analysis.

II:

WEIGHT-DENSITY RELATIONSHIP

Container	No. Cones	Outside dimensions (in.)	Cubic feet displaced
Standard	72	27½ x 20⅛ x 41½	13.30
Invention	72	26⅜ x 20⅛ x 42¼	12.86

Container	Weight		Yarn pounds/cubic fee
	Gross	Net	
Standard	339	294	22.2
Invention	353	322	25.0

The invention container offers a 12.6 percent increase in package density and/or net yarn pounds/cubic feet over the standard container.

It is to be understood that the foregoing description is merely illustrative of preferred embodiments of the invention of which many variations may be made by those skilled in the art within the scope of the following claims without departing from the spirit thereof.

What is claimed is:

1. In a carton for the storing and shipping of conical packages of yarn arranged in superimposed layers, the combination with said conical packages of yarn of a plurality of pads spaced vertically one above the other for supporting said layers of conical packages of yarn and being supported by said layers of conical packages of yarn, said pads containing apertures of alternating size

wherein one aperture is for receiving and engaging the base of said conical package and the following aperture is for receiving and engaging the opposite end of said conical package in a manner so that every other conical package is inverted and positioned in such a manner to provide the minimum amount of space between said conical package, said pads further positioned in said superimposed layers so that the alternating apertures of the adjoining pad of the next layer are positioned to receive and engage the projecting ends of said conical packages from the initial pad with the underside of said adjoining pad as well as to provide the base for the same end of the conical packages on the upper side of said adjoining pad as is contacting said pad on the lower side of said pad; and a plurality of cell-walled partitions spaced vertically one above the other on said pads, said partitions containing cell-walled separator compartments for each conical package to fit within the spacings between said yarn package, each wall of said compartments containing a partial slit in a vertical direction from the top edge of said wall and a partial slit in a vertical direction from the bottom edge of said wall, said partial slits providing flexibility for said wall.

2. The carton of claim 1 wherein the slits in the walls of said cell-walled compartments are centered at the top and bottom positions.

3. The carton of claim 2 wherein the ingredients are corrugated board.

4. The carton of claim 2 wherein the ingredients are corrugated fiberboard.

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