Oct. 2, 1962 R. F. REIFERS 3,056,523

PACKAGING

Filed July 12, 1960 4 Sheets-Sheet 1

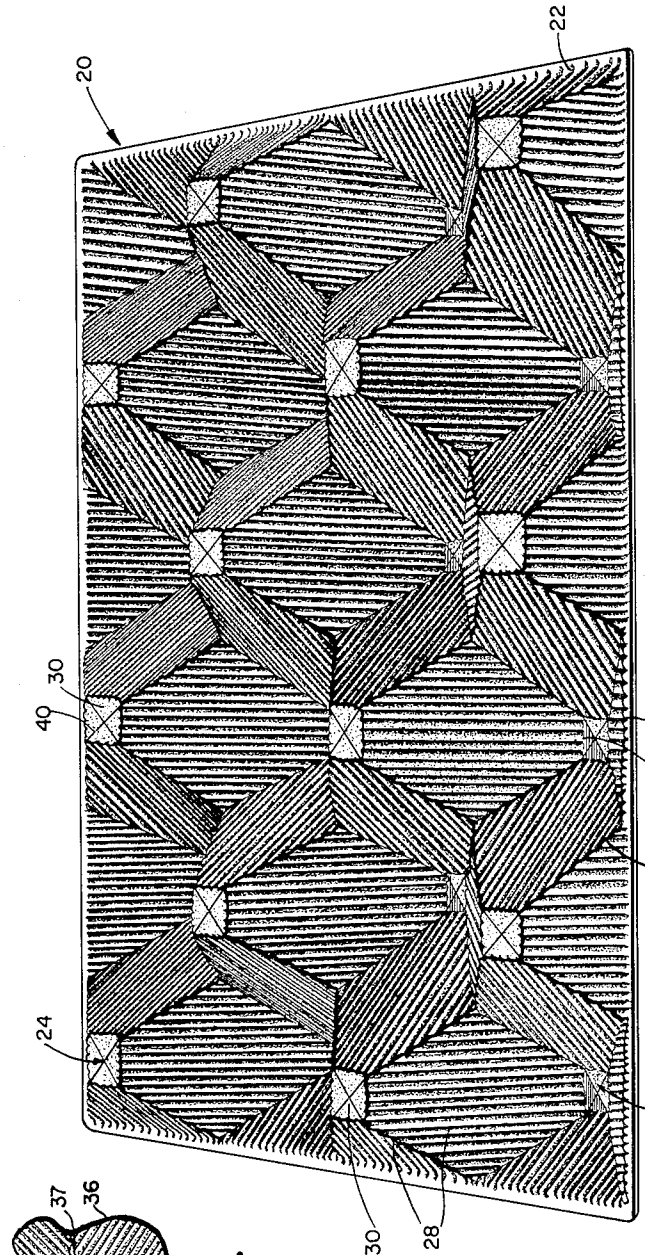


FIG. 1.

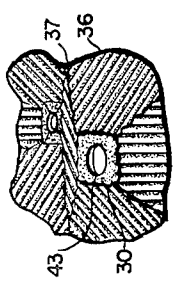


FIG. 1a.

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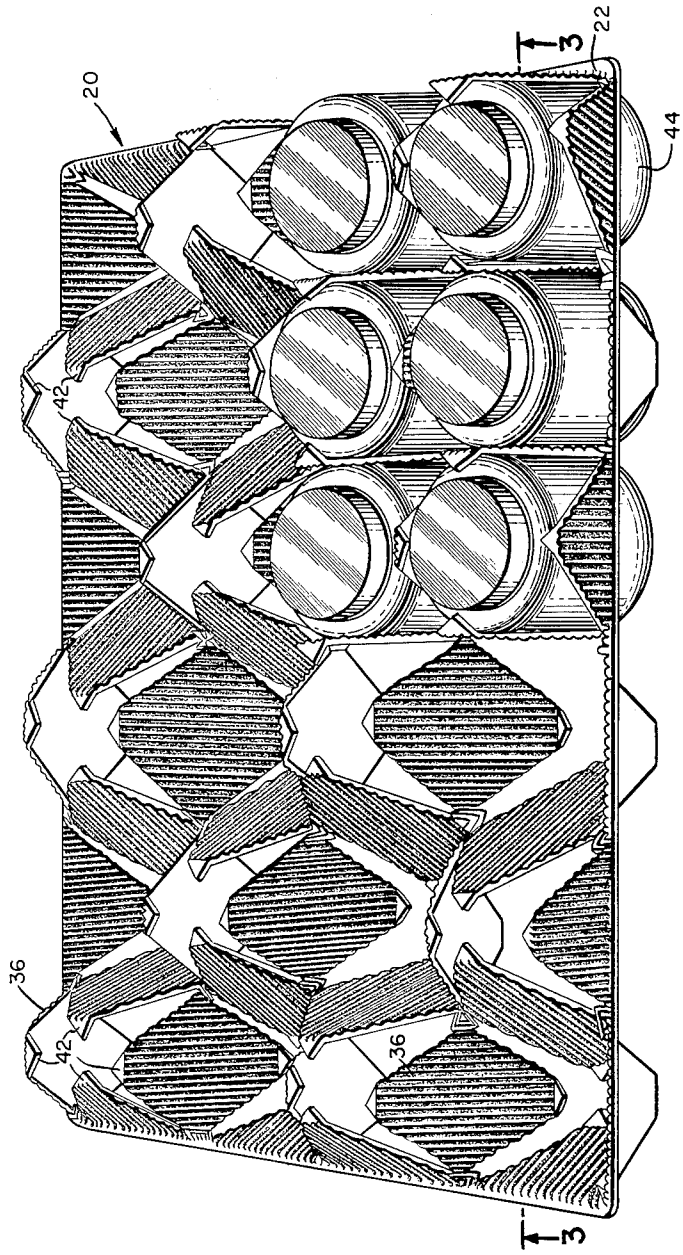


FIG. 2.

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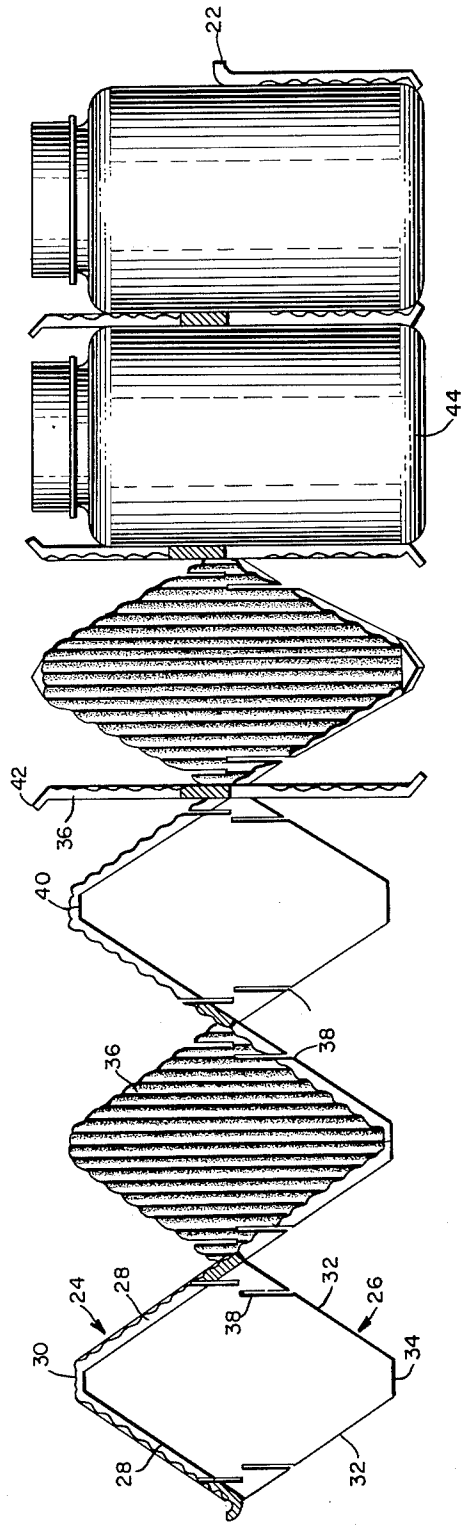


FIG. 3.

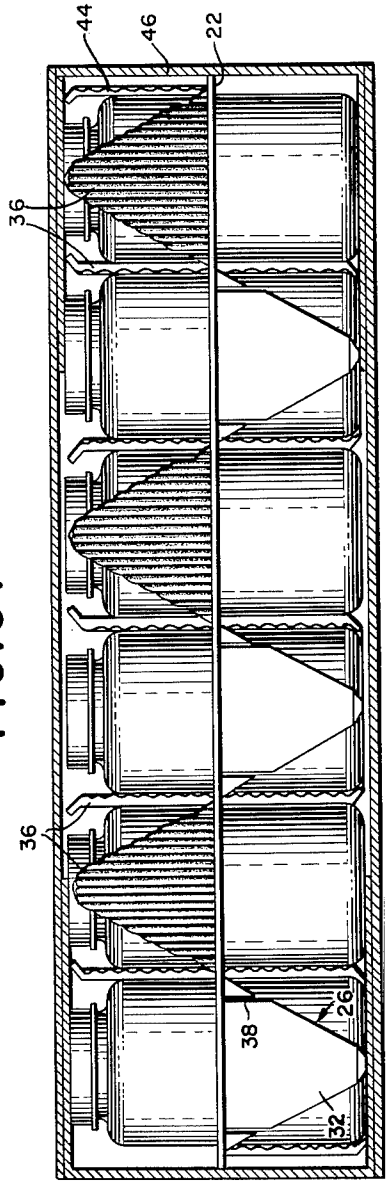


FIG. 4.

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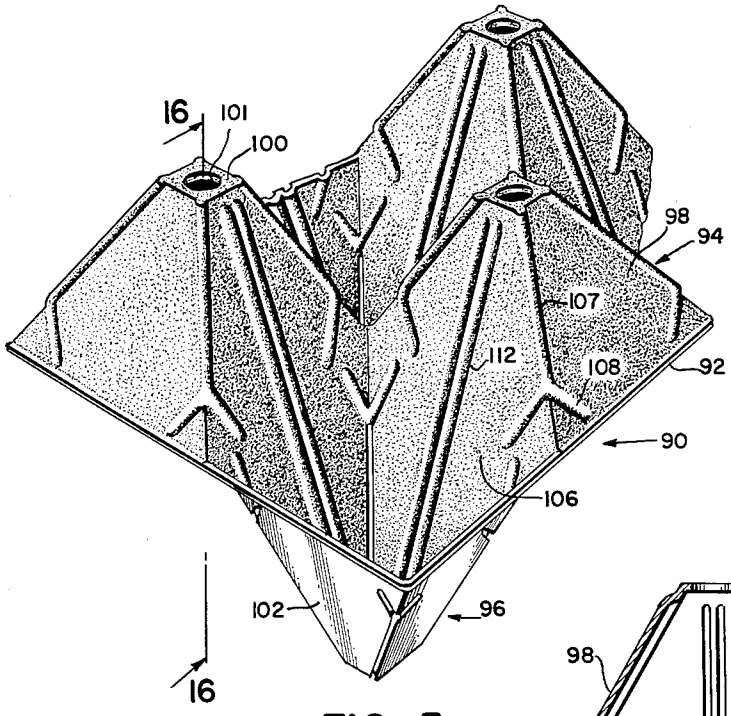


FIG. 5.

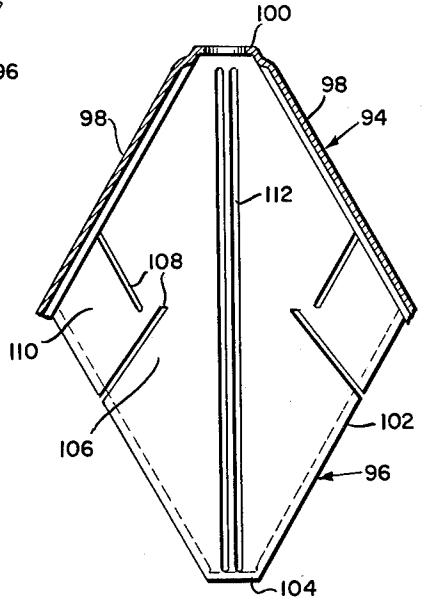


FIG. 6.

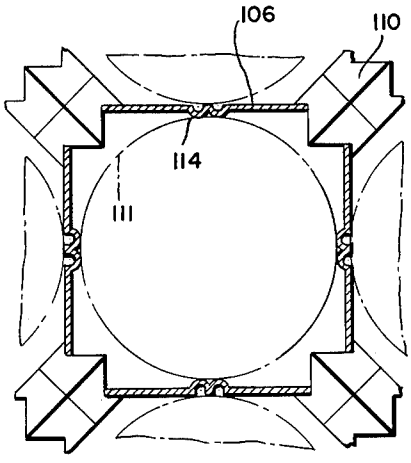


FIG. 7.

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3,056,523

PACKAGING

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11 Claims. (Cl. 217—27)

This invention relates to the packaging of articles in multiple unit packs with protective separators or dividers interposed between the packaged articles. More particularly, the invention relates to molded pulp separators for packaging a plurality of fragile articles, such as glass jars, in multiple unit packs, and to an improved, simplified packaging system embodying such molded pulp separators.

In the packaging of fragile articles, such as glass jars, in multiple unit packs, it is generally necessary to provide some type of protective separator or divider to protect the articles against breakage and possible scraping of each other due to impacts normally encountered in handling and shipping. It has been proposed to employ cartons or boxes provided with integral partitions subdividing them into a plurality of columns and rows of individual cells, but such cellular containers are complicated and expensive to manufacture, and they entail handling problems involving considerable labor and time in packaging of the articles therein. Various separate collapsible fillers usually composed of interlocked longitudinal and transverse cardboard strips adapted to form dividers for plural columns and rows of packaged articles have been employed in the past. However, the standard separators known heretofore have often possessed many disadvantages, and in particular they have required utilization of relatively large quantities of material for fabrication thereof. Consequently, despite the present highly developed state of the packaging art, a need has still existed for a more economical and simplified packaging system embodying new and improved separators for packaging fragile articles in multiple unit packs.

An object of the present invention is to provide new and improved separators for packaging articles in multiple unit packs.

Another object of the invention is to provide a new and improved packaging system utilizing novel separators for packaging fragile articles in multiple unit packs.

Still another object of the invention is to provide a more economical and simplified packaging system embodying unique protective molded pulp separators for packaging glass jars in multiple unit packs.

Yet another object of the invention is to provide new and improved separators for packaging fragile articles, which separators are economical and simple to manufacture, require minimum quantities of material for fabrication, are suitable for automation of handling and packing operations, and yield important savings in total packaging costs.

Other objects and the nature and advantages of the invention will be apparent from the following detailed description of specific embodiments thereof, considered in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a molded pulp sheet adapted to form a separator embodying the invention, shown in its unopened and empty condition;

FIG. 1A is a fragmentary perspective view of a modified portion of a separator embodying the invention;

FIG. 2 is another perspective view of the molded pulp sheet of FIG. 1, shown partially packed with glass jars and in its opened condition ready to function as a separator for other glass jars to be packed therein;

FIG. 3 is an enlarged vertical sectional view taken along the line 3—3 of FIG. 2, showing one portion of the molded

pulp sheet opened and partially packed with glass jars and another portion thereof unopened and empty;

FIG. 4 is a vertical sectional view of a completed package including a plurality of glass jars packed within a separator embodying the invention and enclosed within an outer wrapper;

FIG. 5 is a fragmentary perspective view of a separator representing a third modification of the invention;

FIG. 6 is a vertical section taken along the line 6—6 of FIG. 5, and

FIG. 7 is a fragmentary horizontal section of the separator of FIGS. 5 and 6 shown with glass jars packed therein.

In accordance with certain features of the invention, a separator for packaging fragile articles in multiple unit packs is formed from a contoured sheet of molded pulp provided with a plurality of article receiving pockets having separable hinged segments adapted to provide individual separating panels extending vertically between each pair of adjacent articles packed therein. In the invention, the sheet is contoured to have a plurality of adjacent parallel columns and rows of alternately upwardly and downwardly extending truncated pyramids having their bases aligned in a comomn horizontal plane adapted to be positioned at approximately the midpoint vertically of articles to be packed therein, and the side walls of the pyramids are separable and hinged at the bases so as to form the individual separating panels between adjacent articles packed therein. The sheet is contoured to have a plurality of adjacent parallel columns and rows of truncated cones having their bases aligned in a common horizontal plane adapted to be positioned near one end of articles to be packed therein, with the apexes of the cones projecting from the same side of the sheet, and the side walls of the cones being separable and hinged at the bases to form the individual separating panels.

Referring to FIG. 1, there is shown a contoured molded pulp sheet **20** designed to be formed into a separator constituting one embodiment of the invention. The separator sheet **20** is generally rectangular in horizontal outline, and it is provided with a small plain rim **22** extending continuously around the periphery of the four sides thereof. Dominating the contour of the molded pulp separator sheet **20** are a plurality of upwardly projecting truncated pyramids **24** and a plurality of downwardly projecting truncated pyramids **26**, all of which have their base portions located in a common horizontal plane coinciding with that of the peripheral rim **22**. The upwardly projecting pyramids **24** and the downwardly projecting pyramids **26** are symmetrically arranged to project equal distances from opposite sides of the sheet **20**, and the pyramids **24** and **26** are also symmetrically positioned to alternate in plural parallel adjacent columns and rows for the entire length and width of the sheet **20**.

Each upwardly projecting pyramid **24** includes four side walls **28** converging toward and joined to a small square horizontal apex wall **30**. Similarly, each downwardly projecting pyramid **26** comprises four side walls **32** converging toward and terminating integral with a small square horizontal apex wall **34**. In each instance where the upward pyramids **24** and the downward pyramids **26** are adjacent to each other, which is everywhere on the sheet **20** except directly along the rim **22** thereof, the side walls **28** of the upward pyramids **24** are integral with and constitute continuations of the side walls **32** of the downward pyramids **26**. The resultant composite segments of the sheet **20** formed by the integral side walls **28** and **32** are generally diamond shaped panels **36**, which are adapted to be partially severed from the sheet **20** and interposed between adjacent packaged articles.

Severance of the diamond shaped panels **36** is facili-

tated by providing suitable molded perforations, or score lines, or weakened portions forming separation lines 37 along the meeting edges of the side walls 28 and 32 of the truncated pyramids 24 and 26, extending from the apexes thereof almost to their bases. The diamond shaped panels 36 remain unsevered at the bases of the pyramids 24 and 26 and they are hingedly connected thereto at their vertical midpoint after severance of their apex portions. A plurality of vertical slits 38 are formed in the sheet 20 near said bases to form the hinged connections, and the separation lines 37 extending from the apexes may terminate at the slits 38. The severance of the apex walls 30 occurs along a plurality of crossed diagonal separation lines 40, resulting in the formation of triangular tips 42 at the outer edges of the diamond shaped panels 36. Alternatively, instead of forming any perforations, cut score lines or weakened portions along the separation lines 37 and 40 during the molding of the body of the separator sheet 20, a separator or cutting scorer and severance station may be provided in the packaging line just ahead of the loading station.

FIG. 1A shows a modification of the apex portions 30 of the separator sheet 20, wherein a central aperture 43 is provided in each apex portion 30 instead of having the separation lines 40. The apertures 43 may be formed by molding simultaneously with the molding of the body of the separator sheet 20. Like the separation lines 40, the apertures 43 facilitate severance of the apex portions 30.

FIG. 2 shows all of the diamond shaped panels 36 of the sheet 20 in their severed condition and opened up for the reception of articles to be packed therein, such as a plurality of glass jars 44 shown packed into one corner of the sheet 20. FIG. 3, which generally corresponds to a vertical sectional view taken along the line 3—3 of FIG. 2, shows some of the panels 36 in their unsevered condition, others in their severed and opened position, and some of the glass jars 44 packed therein.

It should be observed that the diamond shaped panels 36 provide complete separation between adjacent glass jars 44. The panels 36 extend vertically along the entire length of the jars 44, and the hinge connections of the panels 36 with the body of the molded pulp sheet 20 lie approximately at the midpoint vertically of the jars 44, which is also the center of gravity of the completed package. Only a single thickness of the molded pulp sheet 20, represented by one of the diamond shaped panels 36, is interposed between and in tangent contact with each adjacent pair of the glass jars 44, yet maximum cushioning protection is provided, particularly against horizontal impacts.

Separators embodying the invention, such as the molded pulp separator sheet 20, possess numerous distinct advantages over the standard separators know heretofore. Since full separation between package particles may be obtained utilizing only a single thickness of sheet material, the new separator utilizes the minimum amount of material required while deriving maximum functional benefits therefrom. Thus, the structure is minimum in size, both in itself and in the dimensions of the completed package. It is evident that such reduction in the amount of packaging material required to achieve an effective package yields important savings in the cost of manufacturing the separators. The geometric shape of the separator structure provides good stability with minimum possible warpage during manufacture, storage and handling thereof. The inclined wall angles of the separator structure facilitate nesting and denesting of a plurality of such separators, which is an important practical consideration in storage and shipment thereof. Separation distances between packaged articles can easily be controlled by minor variations in the separator structure, such as the thickness of the molded pulp sheet material. In the embodiment of the invention illustrated in FIGS. 1, 2 and 3, the molded pulp sheet 20 is provided on one side thereof with a plurality of straight parallel molded corrugations disposed vertically along the diamond shaped panels 36, which corrugations provide improved cushioning characteristics and increase the separation distances between packed articles.

Insertion of the glass jars 44 into their packaged position within the moled pulp separator sheet 20 may be easily accomplished, as has been previously indicated, merely by simultaneous insertion of a plurality of such jars, when properly grouped, into the pyramids constituting article receiving pockets in the contoured molded pulp separator sheet 20, to cause the separable segments thereof to open up and receive the jars. For example, the jars 44 may be assembled in parallel alignment and closely spaced relationship on a pair of common level horizontal supports on opposite sides of the separator sheet 20 in position to register with the truncated pyramids 24 and 26 molded therein, and then the jars may be gradually shoved into the pyramids so that the jars 44 themselves cause severance of the diamond shaped panels 36 from the sheet 20. Alternatively, a two step loading operation may be employed wherein all the pyramids on one side of the separator sheet are simultaneously loaded, and then a similar loading step is performed to fill the pyramids on the opposite side of the separator sheet.

After the glass jars 44 have all been properly inserted into the molded pulp separator sheet 20, a completed package may be formed, as shown in FIG. 4, wherein a suitable outer enclosure 46 is wrapped around the packaged jars 44. The outer enclosure 46 may be any suitable box, carton, or sleeve-type wrapper. It should be noted that when the separator sheet 20 is fully loaded with the glass jars 44, and before the loaded separator is placed within the outer wrapper 46, the loaded separator constitutes a locked load wherein the glass jars 44 are frictionally retained in their properly loaded position within the separator. The existence of this locked load is advantageous in the manipulation and transporatation of the load from one work station to another, such as from a work station where the glass jars 44 are loaded into the separator sheet 20 to another work station where the loaded sheet 20 is packaged within the outer enclosure 46. The locked load facilitates the use of automatic machinery in accordance with modern automation practices in such manipulation and handling operations.

Mention has already been made of the fact that molded pulp separators embodying the invention provide maximum cushioning protection against horizontal impacts. With respect to any vertical impacts, the packaged articles themselves, such as the glass jars 44, provide both vertical body and resistance to vertical impacts, rather than the molded pulp separator sheet 20 or any exterior wrapping thereon. Packaged articles, such as the glass jars 44, are naturally structurally adapted to be strongest in the vertical direction. For this reason the packaged articles are not endangered by the lack of cushioning in the separators against vertical impact. Among other advantages of molded pulp separators embodying the invention, are the relative ease and low cost of manufacturing such separators by well known pulp molding techniques. Good ventilation is obtainable in the resultant package, which permits rapid cooling of packaged articles prior to placing the final wrapper therearound, while at the same time providing adequate protection and separation therefor. Finally, after the packages have been opened at their ultimate destination and the packaged articles have been removed from the separators, trash disposal problems are minimized because separators embodying the invention can be easily compacted into a much smaller space than the standard separators known heretofore.

FIGS. 5, 6 and 7 show a modification which resembles the first embodiment of the invention, in that a contoured molded pulp sheet 90 having a peripheral rim 92 is provided with a plurality of upwardly projecting truncated

pyramids **94** and a plurality of downwardly projecting truncated pyramids **96**, which correspond generally to the pyramids **24** and **26**, respectively, of the first described embodiment. The pyramids **94** and **96** have their base portions located in a common horizontal plane coinciding with that of the peripheral rim **92**. Each upwardly projecting pyramide **94** includes four side walls **98** converging toward and joined to a small square horizontal apex wall **100** having a central aperture **101** formed therein, which aperture **101** corresponds to the previously described aperture **43** of FIG. 1A. Similarly, each downwardly projecting pyramid **96** comprises four side walls **102** converging toward and terminating integral with a small square horizontal apex wall **104**. The side walls **98** of the upward pyramids **94** are integral with and constitute continuations of the side walls **102** of the downward pyramids **96**, and the resultant composite segments of the sheet **90** formed by the integral side walls **98** and **102** are generally diamond shaped panels **106**, which correspond to the previously described panels **36** of the first embodiment.

The diamond shaped panels **106** are separable along their meeting edges **107**, but they remain unsevered at the bases of the pyramids **94** and **96**, where they are hingedly connected at their vertical midpoint after separation of their apexes and meeting edges **107**. Where the separation lines formed by the meeting edges **107** approach the bases of the pyramids **94** and **96**, which also correspond with the vertical midpoint of the panels **106**, the opposite side edges of each panel **106** are provided with diagonal slots **108** extending inwardly from the edges **107** across the panels **106** approximately to the horizontal plane coinciding with that of the bases of the pyramids **94** and **96** and the vertical midpoint of the panels **106**. When the panels **106** are separated along their meeting edges **107**, as by being packed with a plurality of glass jars **111**, the diagonal slots **108** form resulting polygonal hinge segments **110** at the corners of the base of each of the pyramids **94** and **96**, as is best shown in FIG. 7.

A primary feature of the embodiment of the invention illustrated in FIGS. 5, 6 and 7, is the fact that each panel **106** is provided with a plurality of centrally located longitudinally extending corrugations **112**, which extend substantially the entire length of the panels **106**, thereby being disposed vertically along the entire length of the glass jars **111** packed therein, and limited to the points of tangent contact of the jars **111** with the panels **106**. The corrugations **112** provide protective cushioning between the adjacent glass jars **111** at the critically important points of tangent contact therebetween, while the absence of such corrugations elsewhere on the panels **106** where it is unnecessary to provide such protective cushioning, results in a significant saving in the total quantity of molded pulp material needed to produce separators embodying the invention. In the mass production of such separators, the cumulative effect of such utilization of a minimum quantity of material for forming corrugations can produce important economic benefits.

In comparing the structure of the two pyramidical embodiments of the invention, shown in FIGS. 1, 2 and 3, and 5, 6 and 7, it should be observed that in all of these embodiments separable cushioning panels are hingedly connected to the basic separator sheet, which panels become interposed between and extend vertically the entire length of the adjacent articles packed therein. In the case of the pyramidical embodiments, the panels are hinged near the midpoint, vertically of the packed articles, and while loading of the pyramidical embodiments in an automated one step operation is possible, a two step loading operation may be more expedient. However, structures corresponding to the pyramidical embodiments are cheap and easy to manufacture, and the geometric shape of the pyramidical embodiments is naturally inclined to produce few warpage problems.

In all of the several different embodiments of the invention a contoured sheet of molded pulp is provided with article receiving pockets molded therein in a plurality of adjacent parallel columns and rows, each of said pockets having longitudinal separation lines adapted to separate to form hinged panels when articles are inserted into the pockets.

Molded pulp separators embodying the present invention in all of its modifications constitute a new concept in packaging. Significant reductions in total packaging costs may be realized in packaging systems utilizing such separators, while at the same time providing excellent cushioning protection for the packaged articles and facilitating the automation of packaging operations.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit and scope of the invention, and therefore the invention is not limited to what is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A separator for packaging articles in multiple unit packs, comprising a contoured sheet of molded pulp having a medial plane, a plurality of article receiving embossments molded therein in a plurality of adjacent parallel columns and rows across the contoured sheet, said embossments forming alternate pockets in each column and row thereof projecting outwardly from opposite sides of said medial plane of the contoured sheet, each of said embossments comprising displaceable side walls tapering towards a projecting apex end thereof and having a plurality of converging separation lines extending outwardly along the meeting edges of the side walls to said apex end, said displaceable side walls forming individual separating panels for interposition between each pair of adjacent articles packaged therein, said individual separating panels of adjacent embossments being integrally hingedly connected to the contoured sheet adjacent said medial plane, said separating panels of adjacent embossments being disposed in a substantially common plane normally in angular relationship to said medial plane and positionable substantially normal to said medial plane whereby the medial plane of said separator is located intermediately of a packaged article and the adjacent individual separating planes extend substantially in a common plane from opposite sides of the medial plane along the outer surface of the articles being separated.

2. The separator defined by claim 1, wherein the article receiving embossments comprise truncated pyramids in contour, the bases of the pyramids being aligned in said medial plane in the contoured sheet, and the four side walls of each pyramid being separable along the converging separation lines to form diamond shaped panels hingedly connected to the contoured sheet in the substantially common plane.

3. The separator defined by claim 2, wherein molded corrugations extend lengthwise along the diamond shaped panels to increase the cushioning effect of the panels.

4. The separator defined by claim 3, wherein the separation lines extending along the meeting edges of the separable side walls of the truncated pyramid pocket are provided with score cuts to facilitate separation of the panels.

5. A separator for packaging articles in multiple unit packs, comprising a generally rectangular contoured sheet of molded pulp having a plurality of truncated pyramids constituting article receiving portions molded therein in a plurality of adjacent parallel columns and rows across the entire length and width of the contoured sheet, the pyramids in each column and row thereof projecting alternately upwardly and downwardly from opposite sides of the sheet and having their bases formed in the sheet aligned in a common horizontal plane, each of said pyramids having its four side walls tapering outwardly towards a projecting flat apex end, a plurality of converging separation lines extending the meeting edges of the side walls from the base of each pyramid to the apex end thereof and meeting at said apex end, said side walls of adjacent

pyramids being substantially co-planar and forming individual diamond shaped separating panels for interposition between each pair of adjacent articles packaged therein, and said panels being integrally hingedly connected to the contoured sheet at their vertical midpoint adjacent said common horizontal plane for extending vertically along the entire length of the packaged articles, thereby providing complete separation between the packaged articles.

6. The separator defined by claim 5, wherein one side of the contoured sheet is provided with molded corrugations extending lengthwise along the diamond shaped panels to increase the cushioning effect of the panels.

7. The separator defined by claim 5, wherein the separation lines meeting at the apex end of each pyramid extend diagonally thereacross and intersect thereon to form triangular tips on each of the diamond shaped panels when the lines are separated.

8. The separator defined by claim 5, wherein the projecting flat apex end of each truncated pyramid is provided with a central aperture to facilitate the separation of the side walls of the pyramids.

9. The separator defined by claim 5, wherein the separation lines are provided with score cuts to facilitate separation of the panels.

10. A separator for packaging articles in multiple unit packs, comprising a contoured sheet of molded pulp having a plurality of article receiving portions formed therein in a plurality of adjacent parallel columns and rows across the entire area of the contoured sheet, and a plurality of cushioning panels integrally hingedly connected to the sheet at the opposite sides of each of the article

receiving portions at a common horizontal plane near the vertical midpoint of the panels, said panels being normally disposed angularly with respect to said common plane and positionable substantially normal thereto for interposition between adjacent articles received in said article receiving portions to prevent adjacent portions of said articles from engaging each other above and below the common horizontal plane.

11. A separator unit for packaging articles in multiple unit packs, comprising a molded separator sheet having a medial plane, said separator sheet including a plurality of adjacent pocket-forming portions integral with said sheet and disposed in adjacent rows at an angle to each other, said pocket forming portions comprising hollow embossments opening into said medial plane and including a plurality of converging side wall portions, alternate embossments projecting in opposite directions from said medial plane, adjacent side wall portions of adjacent, alternately disposed embossments being hinged to said sheet adjacent said medial plane and including corresponding portions normally disposed in a substantially common plane in angular relation to said medial plane, said adjacent side wall portions of adjacent, alternately disposed embossments being positionable in a substantially common plane substantially normal to said medial plane.

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