

May 5, 1964

C. L. WHITEFORD
HERMETICALLY SEALED, TRANSPARENT, SHOCK
ABSORBING PACKAGE FOR FRAGILE ARTICLES

3,131,846

Filed Nov. 10, 1959

5 Sheets-Sheet 1

FIG. 1

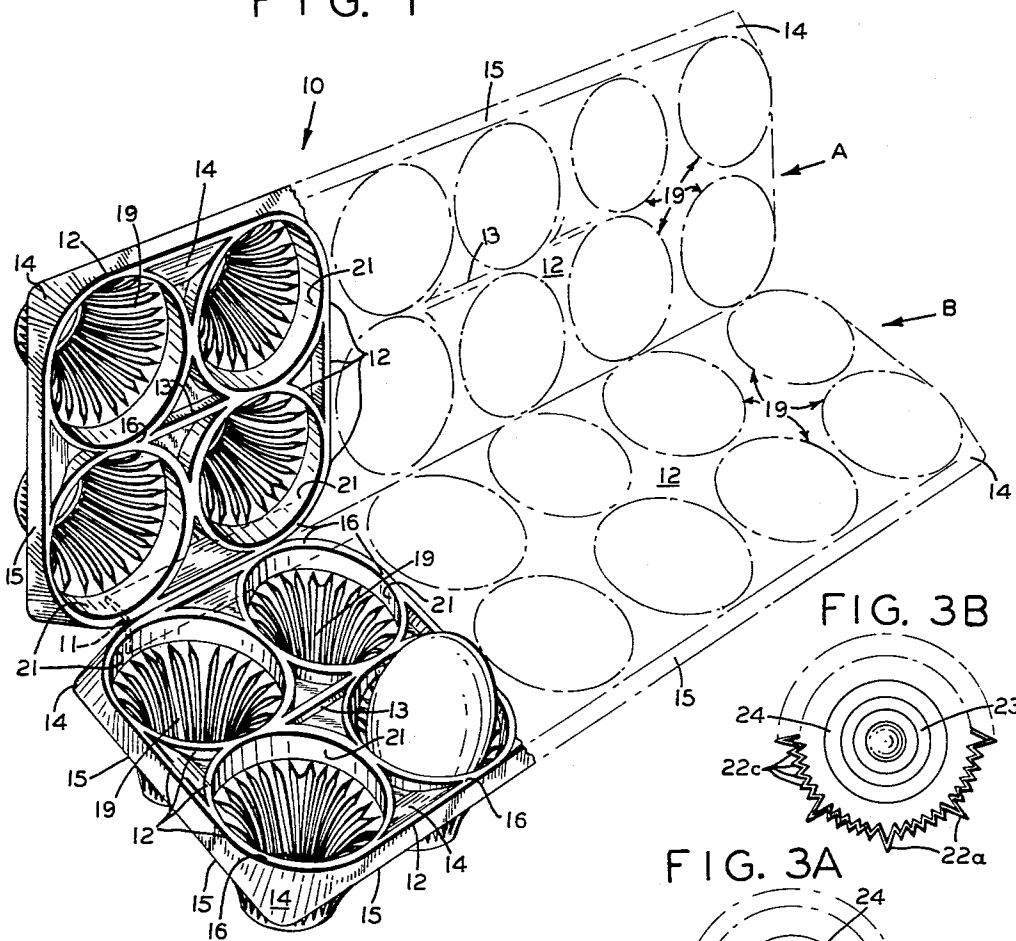


FIG. 3B

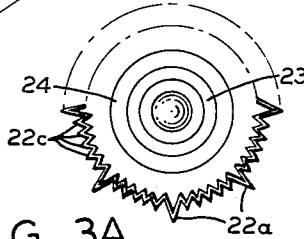


FIG. 3A

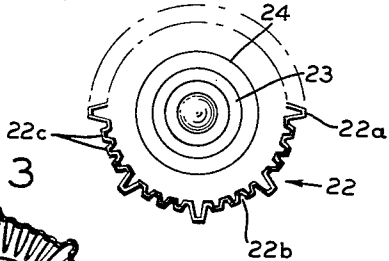


FIG. 2

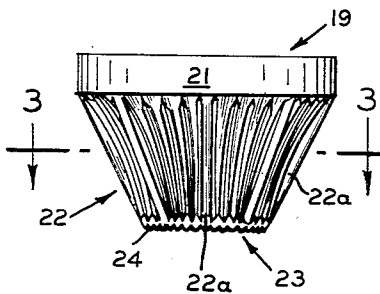
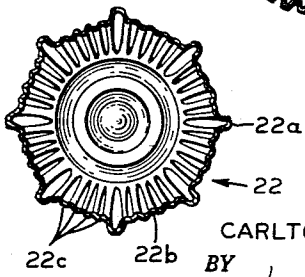


FIG. 3



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FIG. 4

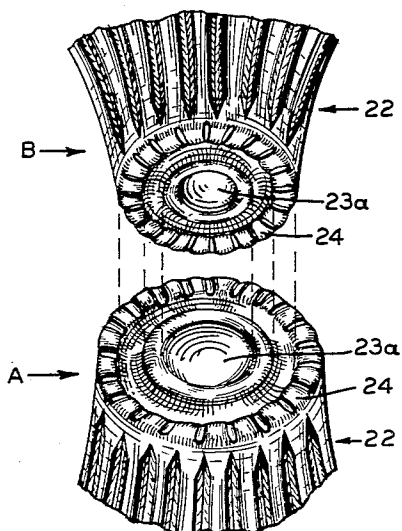


FIG. 5

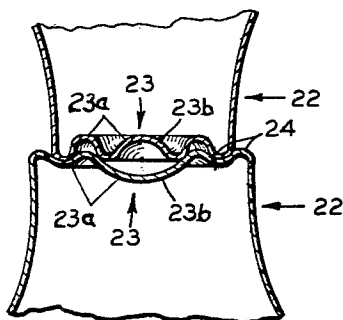


FIG. 5A

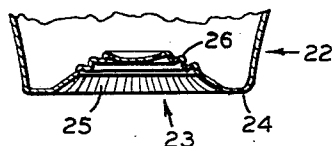


FIG. 5B

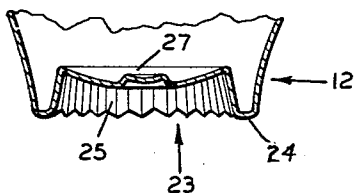


FIG. 6

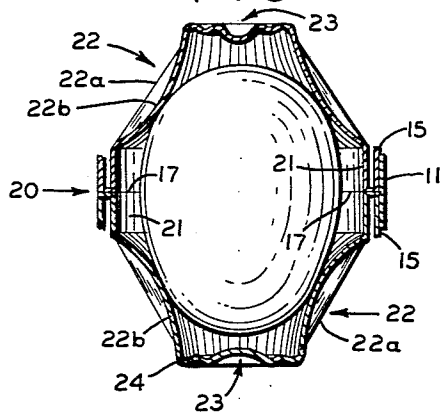


FIG. 6A

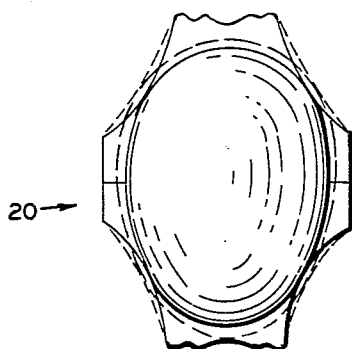
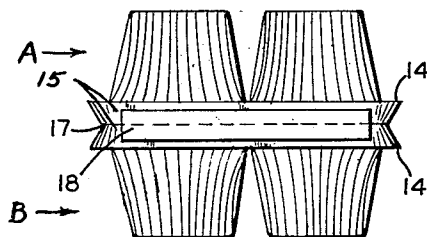


FIG. 7



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FIG. 8

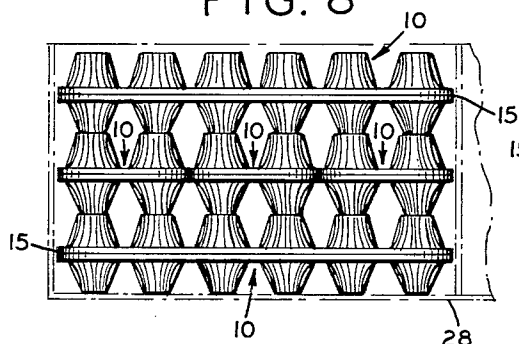


FIG. 9

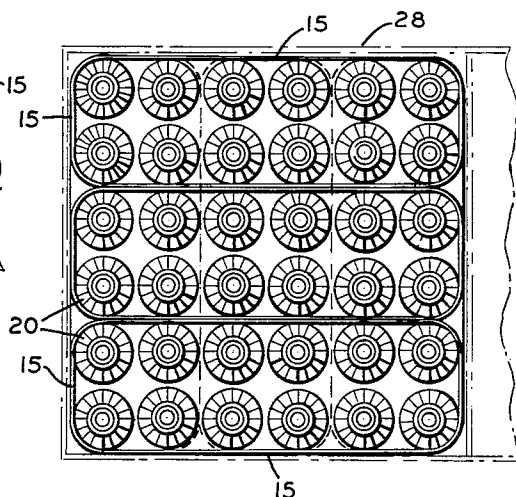


FIG. 10

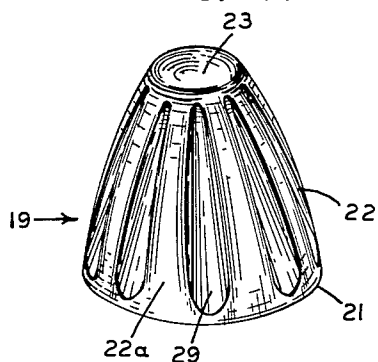


FIG. 11

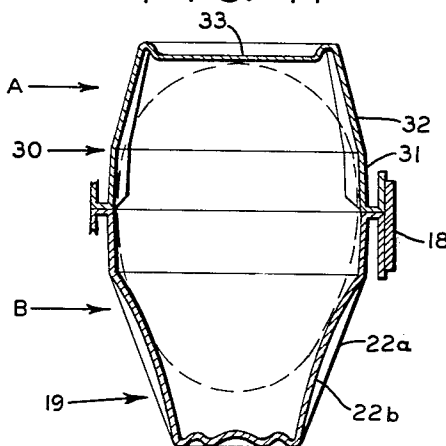
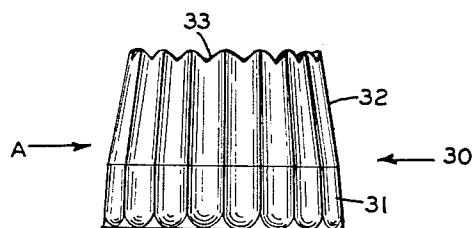


FIG. 12



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FIG. 13

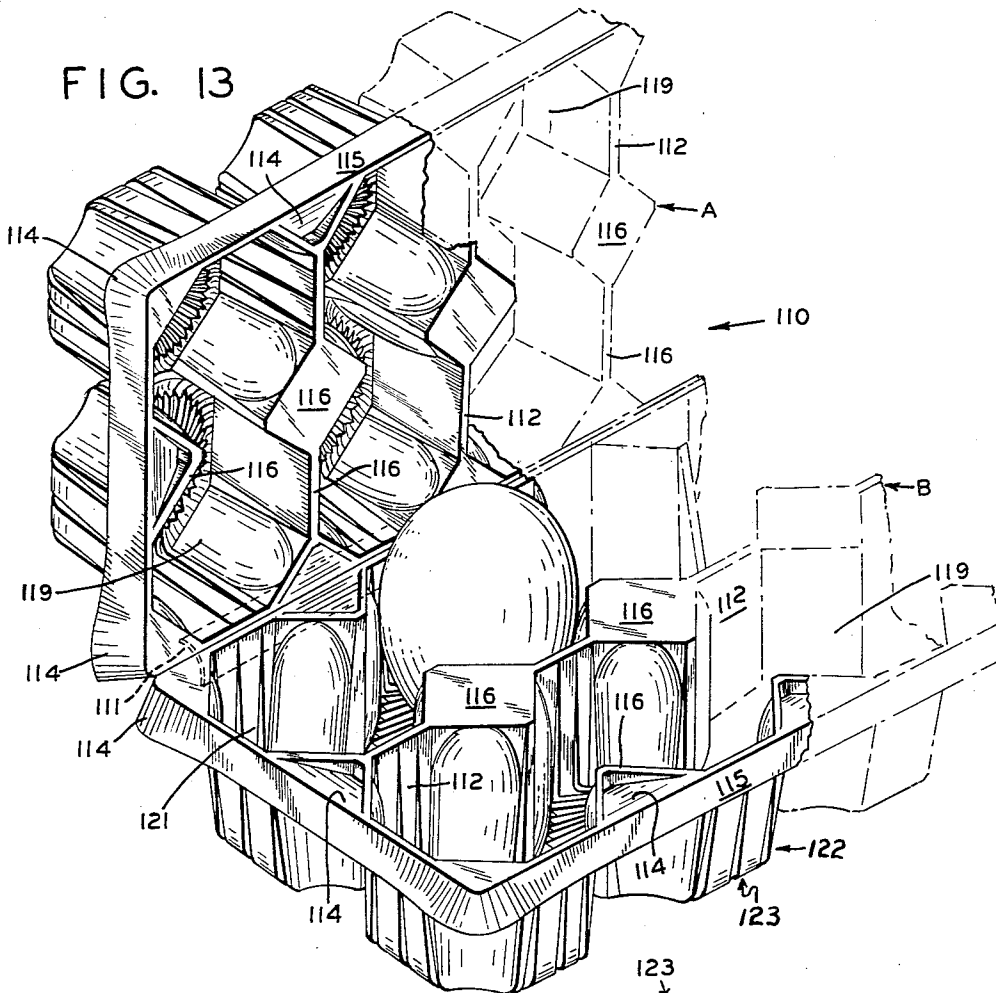


FIG. 14

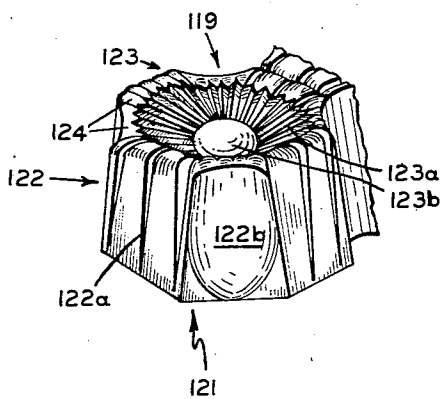
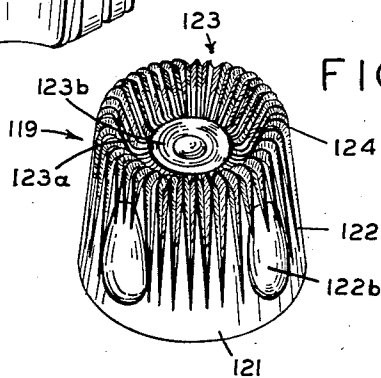


FIG. 15



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FIG. 16

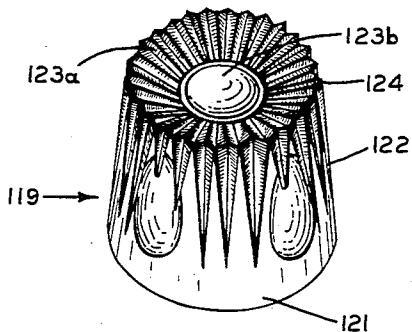


FIG. 17

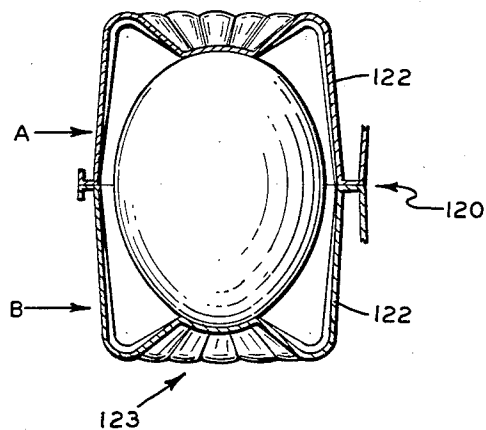


FIG. 18

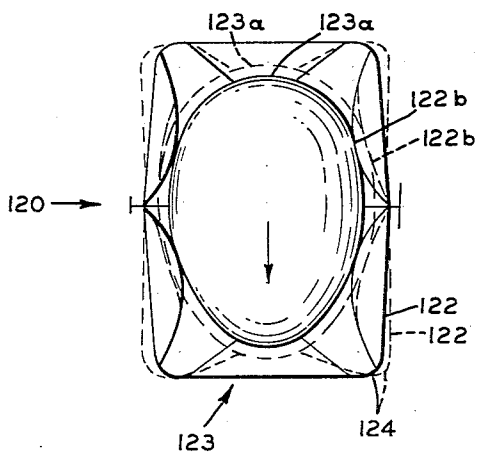


FIG. 18A

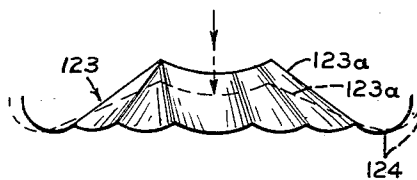


FIG. 19

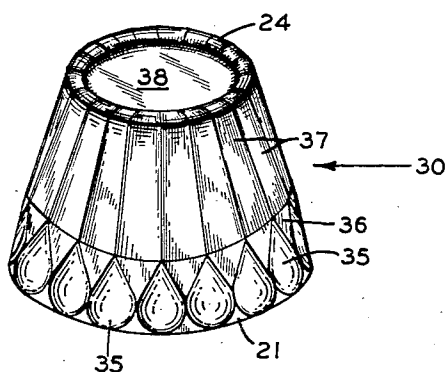
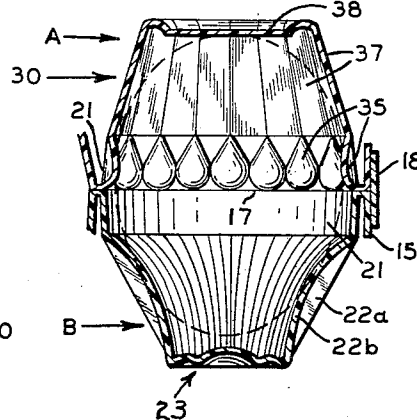


FIG. 20



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**HERMETICALLY SEALED, TRANSPARENT, SHOCK
ABSORBING PACKAGE FOR FRAGILE ARTICLES**
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Filed Nov. 10, 1959, Ser. No. 852,059

1 Claim. (Cl. 229—2.5)

This invention relates to a package or carton for fragile articles and is particularly useful as a package for such foods as eggs, tomatoes, peaches and the like which are easily broken, bruised or otherwise damaged while being handled and transported to the consumer. More particularly, the invention is directed to a multi-cell package comprising top and bottom sections that may be hermetically sealed together and in which each cell of the completed package is resiliently expandable to accommodate various sized articles placed therein.

For example, eggs graded or classified as large may vary in diameter within a range of approximately $1\frac{5}{8}$ – $1\frac{7}{8}$ inches and in length within a range of approximately $2\frac{1}{8}$ – $2\frac{1}{2}$ inches. Therefore, to securely hold each egg within such a size range against rattling (a major cause of breakage) the cell, or cavity, of an egg package must be free to expand, or contract, at least $\frac{1}{4}$ inch in diameter and $\frac{3}{8}$ inch in length. Further, since the cell of a package according to this invention is resiliently expandable, the packaged contents will be resiliently supported.

For the sake of clarity and conciseness the following disclosures will be limited to a description of this invention as a package or carton for eggs, for which it is particularly suited and has perhaps its greatest utility, however, the utility of the invention is not so limited.

Egg packages presently widely used are made from paper materials i.e. pressboard, cardboard and the like, and all have a major disadvantage in that the eggs are not sealed from ambient atmosphere which causes deterioration in egg freshness.

Another serious disadvantage of the present paper egg cartons is due to the inflexibility and non-resiliency of the egg cells. As a result the egg cells must be made large enough to accommodate the largest size egg to be packaged. Since egg sizes vary greatly in maximum diameter and length many of them are loosely contained within their cell and therefore subject to breakage.

A further major disadvantage of present egg cartons is that they require elaborate, time consuming set-up procedures (assembling the pre-cut sheets) at the packing site. The advantage of such a package is that it can be shipped in sheet form, generally referred to as "flats," for economical transportation, however, before being filled they must be assembled or made up to form a carton. Obviously, such time consuming setting-up procedures result in high packaging costs.

The foregoing disadvantages of paper egg cartons are overcome in a very great measure by the egg package of this invention which in addition provides an egg carton of any shape (rectangular, square, circular, etc.) of transparent thermoplastic resin. A preferred thermoplastic resin is biaxially oriented polystyrene which is very resilient, and also has the advantage of being transparent; however, the invention is not limited to polystyrene.

To form the egg package according to this invention a sheet, of a thickness on the order of 8 to 12 mils, of polystyrene, or other suitable thermoplastic resin or like material, is placed in a press, heated and under the influence of fluid pressure (positive and/or negative pressure), the sheet is forced into a mold. According to this invention the package so made can be nested and stacked one within another, with a minimum of waste space in the stack, and economically transported to the packer or

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farmer without requiring any final setting-up operations prior to packing. Once the package is filled it is quickly and simply closed and simultaneously hermetically sealed. In addition to providing a hermetically sealed egg package, each egg, regardless of its size variations, is resiliently suspended and firmly held in its respective egg cell. As a result, egg spoilage and breakage are greatly reduced.

Therefore, a principal object of this invention is to provide a hermetically sealed egg package.

A further principal object of the invention is to provide a multi-cell package with resiliently expandable cells which also resiliently support the cell contents.

Another object of the invention is to provide a multi-cell package of transparent plastic resin material such as biaxially oriented polystyrene.

A further object of the invention is to provide a transparent, multi-cell, preformed egg package which can be nested and stacked for economical transportation to a packing site, packed without setting up operations and easily closed and hermetically sealed.

Another object of the invention is to provide an egg package which resiliently suspends the eggs within cells formed integral with a rigid framework.

A further object of the invention is to provide a multi-cell egg package which when packed can be stacked without danger of the stack shifting or tipping.

A still further object of the invention is to provide an egg package of transparent thermoplastic resin which can be utilized as an egg tray after removal of a portion of the package.

The above enumerated and additional objects and advantages of this invention will be apparent from the following detailed description of the annexed drawings illustrating preferred embodiments thereof and in which:

FIG. 1 is a partly detailed, partly phantom, perspective view of one embodiment of an egg package according to the invention;

FIG. 2 is a side elevation of a single cup shown in the egg package of FIG. 1;

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 2 and FIGS. 3A and 3B illustrate cross-section modifications of the cup of FIGS. 1 and 2;

FIG. 4 is an expanded detailed view illustrating the cooperation between the end walls of egg cells in forming the stacked egg cartons shown in FIGS. 8 and 9;

FIG. 5 is a cross-sectional elevation illustrating the cooperation between the end walls of the cell shown in the expanded view of FIG. 4. FIGS. 5A and 5B illustrate modifications of the end wall construction of an egg cell cup;

FIG. 6 is a cross-section elevation of the egg cell formed upon closure and sealing of the sections of FIG. 1 and illustrates the manner in which the cells enclose and resiliently support an egg;

FIG. 6-A is a cross-section diagrammatic view along the lines of FIG. 6 illustrating expansion of an egg cell to accommodate both small and large size eggs;

FIG. 7 is an end elevational view of an egg package illustrating the peripheral flange and printed indicia affixed thereto;

FIGS. 8 and 9 are generally schematic representations of a stack of transparent egg cartons illustrated in FIG. 1 as described in connection with FIG. 4;

FIG. 10 is a side elevational view of a modified egg cup;

FIG. 11 is a cross-sectional elevation of a modified egg cell wherein the top section enclosing the large end of an egg has a different configuration than that of the bottom section;

FIG. 12 is a side elevational view of the modified cup shown in FIG. 11 enclosing the large end of an egg;

FIG. 13 is a partly detailed, partly phantom perspective

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view of a modified form of egg package according to the invention;

FIG. 14 is a side elevation of a single cup shown in the egg package of FIG. 13;

FIG. 15 is a side elevation of modified form of the cup of FIG. 14.

FIG. 16 is a side elevation of modified form of the cup shown in FIG. 15;

FIGS. 17 and 18 are cross-sectional elevational views of an egg cell of the egg package shown in FIGS. 13 to 16. FIG. 17 particularly illustrating that the end wall of the cell supports the egg (compare FIG. 6). FIG. 18 illustrates the expandable feature of the egg cell of FIGS. 13 to 16 to accommodate both small and large eggs.

FIG. 18A is a diagrammatic illustration of the action of the end wall of the cell of FIGS. 13 to 18 in resiliently expanding and contracting under static and dynamic or intermittently applied forces.

FIG. 19 is a perspective view of the cup of FIG. 20 enclosing the large end of an egg.

FIG. 20 is a cross-sectional view of a presently preferred embodiment of the invention for large and extra large eggs in which the cups compartments of the section enclosing the large end of an egg is a modified version of the cup shown in FIG. 12. The small end of the egg being enclosed by a cup of the type shown in FIGS. 1 to 9 and 11.

Referring to the drawings, FIG. 1 illustrates one embodiment of an egg package according to this invention, generally indicated by reference numeral 10. The package comprises a top section A and a bottom section B hinged at one longitudinal edge by a strip of adhesive paper, plastic or other suitable means 11 which may also serve as a label. Each section of the package 10 contains a plurality of complementary compartments or generally cup-shaped members 19 having a side wall, generally designated 22 and an end wall, generally designated 23. Each cup 19 of both sections A and B may be of the same configuration; however, for eggs graded as large, the cups in the top section A, enclosing the large end of an egg, are preferably of a larger size than the complementary cup in section B. That is, the diameter of the end wall of a cup enclosing the large end of an egg is made greater than the diameter of the end wall of the complementary cup enclosing the small end of the same egg. Since the diameter of the cylindrical entrance portion 21 of each cup remains the same in both sections A and B, the inclination of the side walls of the large cup are less than the inclination of the side wall of the small cup. As a result, the configuration of each cup is generally the same but the size of the receptacle formed by the cups is varied.

While not fully illustrated in the drawings, it is also contemplated to make the height (or depth) of the cups in sections A and B of different dimensions. For example, the depth of cups 19 in the bottom section B may be much shallower than the cups in the top section A. In such an arrangement the bottom section mainly provides resilient support for the egg while the top section essentially prevents or limits rattling movement of the cell contents. The reverse arrangement is also contemplated, as shown in FIG. 11 wherein, for example, the bottom section B of the package has deep cups 19, say $\frac{3}{4}$ the height, or longitudinal dimension of an egg, and the top section has shallow cups $\frac{1}{4}$ the length of an egg. In this arrangement the bottom section B will resiliently support the eggs while the primary function of the top section A is to prevent egg rattle and form a cover for the hermetically sealed package.

Each cup 19 is integral with a rigid, embossed or ribbed, web 12 forming a network of flat contact surfaces 16. When the top and bottom sections are closed and sealed together the package thus formed comprises a plurality of air-tight egg cells 20 best seen in FIG. 6. To form an air-tight seal at the interface 17 (FIGS. 6 and 7) be-

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tween sections A and B any suitable adhesive or sealing compound may be brushed, rolled, or otherwise applied to the flat surfaces 16 of web 12 at the carton manufacturing plant or just prior to assembly. A pressure sensitive adhesive is preferred since it accomplishes the dual functions of removably securing sections A and B while also acting as a sealing compound.

To facilitate opening the package, finger grips 14 are provided in sections A and B along the outer edge of web 12 between adjacent cups and also at the corners of each section as indicated in FIG. 1. The corner finger grips are formed by outwardly flaring the normally vertically disposed peripheral flange 15 at each corner. Flange 15 is provided essentially as a surface to which printed matter 18 and hinge 11 can be secured and to help strengthen the entire package. Such labels may be provided with any suitable tear-strip means 17, to open the package as illustrated by the broken lines in FIG. 7.

A discontinuous stiffening rib 13, disposed along the longitudinal axis of the web 12 in both sections A and B provides longitudinal rigidity to each section and the completed package. It should be noted that either or both sections A and B may be utilized as an egg tray when the sections are separated.

As illustrated in FIG. 2, each cup 19 comprises a generally frusto-conical receptacle having a cylindrical entrance portion 21, a side wall generally designated 22 and an end wall generally designated 23. The cylindrical portion 21 formed as an integral part of web 12 provides a rigid support for cups 19. Side wall 22 comprises a plurality of circumferentially spaced upstanding ribs 22A interposed between circumferentially spaced resiliently expandable panel members 22B, both of which depend from cylindrical portion 21 and are joined to the end wall 23 by a radially corrugated annular radius 24, best seen in FIGS. 4 and 5. Panels 22B are curved inwardly between the cylinder 21 and annulus 24 whereby the inside diameter of panels 22B is less than the inside diameter of ribs 22A. As a result of the inward curvature of panels 22B, an egg within cup 19 is resiliently supported at a surface adjacent the strong ends of the egg by panels 22B as best illustrated in FIGS. 6 and 6A. It is noted that panels 22B can be smooth surfaced, in other words, formed without corrugations, pleats, or flutes 22C. However, a pleated panel is preferred since the pleats 22C increase the resiliency and expandability characteristics of the egg cells. This is especially important with large heavy eggs whereas the small light eggs may be suitably suspended by a smooth panel member such as shown in the modification of FIG. 10.

It will be evident from FIG. 1 that each section A and B of package 10 is made from a single sheet of thermoplastic resin, preferably biaxially oriented polystyrene, comprising a rigid framework and resiliently flexible side wall panels in the cup members. The rigid framework supporting the side wall panels 22B, and end wall 23, comprises web 12, including the cylindrical portion 21 of cup 19, side wall ribs 22A and strengthened annular radius 24. As indicated above, the frame does not contact the egg but simply provides a strong anchoring means for the resilient panels 22B and the end wall 23. As indicated in FIGS. 8 and 9 this frame is strong enough to support the weight of several egg packages stacked one on top of the other without collapsing the bottom packages.

The cross-sectional views illustrated in FIGS. 3, 3A and 3B show alternative cross-section configurations of the ribs 22A and panel members 22B comprising the side wall of cups 19 and the egg cells 20.

As previously disclosed, in connection with the description of FIG. 1, the diameter of end walls 23 of cups 19 in sections A and B are varied to provide a larger cell for the large end of an egg. This feature has an additional advantage as illustrated in FIGS. 4, 5, 8 and 9.

As clearly seen in FIG. 4 the concentrically corrugated

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disc 23A and annular radius 24 of the small cup B nests and intermeshes with the concentrically corrugated disc 23A and annular radius 24 of the large cup A. As a result a stable stack of transparent egg packages can be attractively displayed (FIG. 8). Further when the packages are crated for shipment to a consumer outlet all eggs within the crate are resiliently suspended and spaced from one another in separate cells and each egg cell is spaced from the shipping crate by the bumpers formed at the periphery of the web 12 by the peripheral flanges 15 which will be readily apparent from an examination and comparison of FIGS. 6, 8 and 9.

Various modifications of the end wall construction are shown in FIGS. 5, 5A and 5B. As shown in FIG. 5 the preferred construction of end wall 23 comprises an annular or concentrically corrugated disc 23A having a centrally located convex bottom or dome 23B. Essentially this construction strengthens the bottom wall of the cups, however, large eggs placed within the cup may be long enough to contact the dome 23B. The dome then assists the panel member 22 in resiliently suspending the egg, however the panel members are the major support means. Referring to FIG. 5 it is noted that entrapped air between the corrugated discs 23A will act to cushion the intermeshed egg cells against the effects of sudden shocks arising when the loaded egg crates are handled in transit. The air entrapped between the end walls 23 is free to escape, however the escape path is so small and tortuous that a pneumatic shock absorber is formed by the intermeshed corrugated discs 23A.

The bottom wall construction shown in FIG. 5A comprises a pleated, upright, frusto-conical member 25 contiguous with the radially corrugated annular radius 24 and having a central circumferentially corrugated dome member 26 to provide a spring-like bottom wall which would be most suitable in a resiliently paneled cell for very large heavy eggs.

In FIG. 5B the bottom wall construction comprises a pleated, upright, frusto-conical member 25 contiguous with the radially corrugated annular radius 24 and having a central concavity 27.

Each of the modifications of the end wall 23 shown in FIGS. 5A and 5B provide greater resilient support for an egg by the end wall of the cup and would only be required in an egg package for extra large, very heavy eggs wherein the side wall panels 22B may not be sufficient to overcome the dynamic forces encountered in trucking extra large eggs over rough country roads.

As seen in FIGS. 6 and 6A the egg cells 20 suspend and firmly engage each egg at a surface adjacent the end of the egg which is much stronger than the mid-section. The fragile mid-section of the egg is spaced from the cell and protected by a bumper formed by the cylinder 21 and flange 15. As previously explained the panels 22B are resiliently expandable so that various sized eggs will be accommodated and resiliently supported. FIG. 6A graphically illustrates this feature in which the solid line indicates a small egg and the dotted lines a large egg. It should be noted from FIG. 6A that the overall dimensions of the package 10 remain the same for both large and small eggs. In FIG. 6A only the height and width are shown unchanged but the same is also true for the overall length of the package since the added space requirements for a large egg is provided by the difference in radii of the panels 22B and the ribs 22A of the side walls 22. In other words, the panels 22B expand outwardly into the space defined by concentric planes formed by revolution of concentric conical sections having radii equal respectively to a distance measured from the vertical axis of cell 20 to the inner surface of side wall panel 22B and the outer surface of side wall rib 22A.

As shown in FIG. 7 the peripheral flange 15 of each section A and B provides a surface to which label 18 and/or labeled hinge 11 are applied. The label 18 shown in FIG. 7, is provided with a suitable tear-strip means

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(dotted line) overlying the interface between the two sections of the package. As indicated in FIG. 1 a hinge 11 may be provided along one longitudinal edge of flange 15, alternatively, the printed sheet 18 may also be used to hinge the two sections together.

As previously disclosed in connection with the description of FIG. 4, FIGS. 8 and 9 illustrate an attractive display of transparent egg packages which can be safely stacked in a display case. Also FIGS. 8 and 9 show that the packaged eggs, stacked in an egg crate 28 are spacedly suspended from one another and the side walls of the egg crate to eliminate breakage in transit.

FIG. 10 discloses an alternate construction for the cups of egg package 10 as seen in FIG. 1. The cup 19 according to FIG. 10 comprises a cylindrical entrance portion 21 and a side wall 22 having a plurality of peripherally spaced ribs 22A similar to the ribs 22A of FIG. 2. Between adjacent ribs 22, elongated, smooth surfaced, inwardly curved recesses comprise the resiliently flexible panel members 29 similar to panel members 22B of FIG. 2. The end wall 23 of the cup of FIG. 10 is simply an inwardly inverted concavity. However, the end wall may be of the construction shown in FIGS. 5, 5A or 5B. It will be apparent from a comparison and the description of FIGS. 2 and 10 that each construction provides a resiliently flexible cup 19 in which the side wall resiliently supports an egg about a surface adjacent the ends thereof.

As previously mentioned, the egg package of the invention may comprise two substantially identical sections A and B having cups of different dimensions as illustrated in FIG. 4 and also that the cups of sections A and B may be of varied depth such as illustrated in FIG. 11.

It is also contemplated to provide an egg package 10 having sections A and B in which the cups 19 are of distinct configurations as also shown in FIG. 11. An egg package constructed according to the teachings of FIG. 11 comprises a bottom section B having cups 19 such as shown in either FIG. 2 or 10. The cups in top section A of the package, enclosing the large end of an egg, may comprise a circumferentially scalloped or serrated side wall 30 best seen in FIG. 12. The side wall comprises a corrugated generally cylindrical entrance portion 31 and a correspondingly corrugated frusto-conical wall portion 32 terminating in a depression 33 forming the end wall of the cell. It will be apparent that the cup 30 functions essentially to resiliently support an egg against movement in a horizontal plane and will provide little resilient support in a vertical plane. However, it should be noted that it is a customary practice in the egg farming and packing industry to transport eggs with the small end down. Thus, to prevent the yolk being broken within the small end of the shell while in transit, eggs are shipped with the small end down to keep the yolk within the large end of the shell where it is less likely to be broken by contact with the shell. As a result the egg package according to FIG. 11, will be at least as utilitarian as a package which will resiliently support an egg at either the large or small end as disclosed in FIG. 1.

Another modification of an egg package according to the present invention is illustrated in FIGS. 13-18. Essentially, the difference between these modifications is that the side wall of the egg package shown in FIGS. 1-12, 19 and 20 resiliently support an egg; whereas the end wall of the egg package according to FIGS. 13-18 provides resilient egg support. In both modifications an egg is resiliently suspended and each package is preferably made of a thin transparent sheet of resilient thermoplastic material by a heat and pressure forming method and hermetically sealed.

A further distinction between these two modifications is that each egg in the package according to FIGS. 1-12, 19 and 20 is contained within a hermetically sealed cell within a hermetically sealed package. That is, each cell

is sealed from the other cells in the package. As a result, if one cell is damaged, only the egg contained therein is exposed to atmosphere. However, in the modification of FIGS. 13 to 18, if one cell is damaged all the eggs in the package would be exposed to atmosphere. Obviously, this disadvantage can be overcome as in the modification of FIGS. 1-12, 19 and 20 by eliminating communication between cells and making each cell a separate or distinct member.

As shown in FIG. 13, the package generally indicated by reference numeral 110 comprises a top section A and a bottom section B hinged along a longitudinal edge by a strip of printed paper, plastic, or other means 111. Each section in the package contains a plurality of complementary octagonal cup-shaped members 119, having a side wall generally designated 122 and an end wall generally designated 123. Each cup 119 of both sections A and B are of the same size and configuration. However, as in the modification of FIGS. 1-12, the cups enclosing the large end of an egg may be made larger than the cup enclosing the small end of an egg. However, the area of the inlet portion 121 is the same for each cell in both sections A and B; and as fully explained hereinabove the cups in section A may be of different configuration than the cups of section B. For instance, the cups of section B may be as shown in FIG. 2 and the cups of section A may be as shown in FIG. 14, 15 or 16 and vice versa.

Each cup 119 is integral with and suspended from a network of ribbing comprising a web 112. It will be noted that the ribbed web 112 of section B extends longitudinally of the section whereas the ribbed web of section A extends laterally of the section. As a result, when the sections A and B are closed and secured together the package thus formed will be longitudinally and laterally rigid. Contact surfaces 116 are formed by the web 112 whereby sections A and B may be secured together by a suitable adhesive or cement applied with a brush, roller or other means to contact surfaces 116. As previously disclosed, a pressure sensitive adhesive is preferred since it not only secures the section together, but also forms an air-tight seal between the package sections.

To facilitate opening the package, finger grips 114 are provided on both sections A and B about the periphery thereof as previously disclosed in connection with FIG. 1. Additionally, longitudinal passages between adjacent cups in section B and lateral passages between adjacent cups in section A are provided so that the eggs may be easily grasped and removed.

Illustrated in FIG. 14 each octagonal cup 119 provides a generally cup-shaped receptacle having an octagonal entrance portion 121, a side wall generally designated 122 and an end wall generally designated 123. Side wall 122 comprises a plurality of spaced rigidized panels 122A alternating with inwardly curved, resiliently expandable recesses 122B depending from web 112. It will be seen in FIG. 14 that side wall panel 122A and side wall recess 122B merge or fair into an alternately corrugated and smooth surfaced octagonal radius 124. The corrugated portions of octagonal radius 124 correspond with and are continuations of the corrugations in panel 122A whereas the uninterrupted portions of radius 124 correspond with the uninterrupted recess 122B. It is noted that recess 122B may be of tear drop shape as in FIGS. 15 and 16 in which case octagonal radius 124 may be continuously corrugated as in FIG. 15. The end wall 123 comprises a radially fluted or corrugated, upright frusto-conical element 123A terminating in a centrally located concavity 123B.

The cup modification shown in FIG. 15 differs from the cup of FIG. 14 mainly in that it is circular in cross section and generally continuously corrugated except for the interruptions made by the smooth circumferentially spaced recesses 122B. Also, the radius 124 interposed between side and end walls 122 and 123 respectively

comprises a corrugated annulus 124 and the entrance portion 121 is cylindrical.

In FIG. 16 the side wall 122 of cup 119 is substantially identical with the side wall of the cup illustrated in FIG. 15. The main difference between these two modifications is that the corrugations in upright frusto-conical end wall member 123A and the corresponding side wall corrugations are not continuous as in FIG. 15. The grooves in the side wall corrugations are interrupted at annulus 124 by the ridges of the corrugations of the frusto-conical member 123A.

In the cups constructed as above described in connection with FIGS. 14, 15 and 16 an egg is resiliently supported by the end wall 123 as best shown in FIG. 17 wherein sections A and B are in a closed position forming an egg cell 120. Only one cell is shown in FIG. 17, it being understood that each cell formed by the closed sections is identical with the cell illustrated.

It will be clear from a comparison of FIGS. 17 and 18 that the weight of the egg and the forces acting on each cell in the vertical plane will be transmitted primarily to the resilient end wall 123. The side wall recesses 122B provide resilient expansion necessary to accommodate the differences in diameter of various sized eggs and prevent egg rattle.

Referring particularly to FIG. 18 the solid lines show the relation between the egg cell 120 and a small egg enclosed therein. It will be seen that the small egg, in solid lines, just engages the recesses 122B and rests on the bottom or end wall 123 without causing any appreciable distortion of cell 120. The large egg, however, does distort the cell, as shown in the dotted lines of FIG. 18. The large egg pushes out or partly inverts recesses 122B and expands the diameter and circumference of annulus 124 which slightly decreases the angle of inclination of side wall 122. FIG. 18A diagrammatically illustrates the action of the bottom wall 123 under dynamic forces to which an egg is subjected in handling and transportation as well as in accommodating large size eggs. When a force, illustrated by the arrow, is applied to the top of a hollow, pleated, plastic cone it fans out to increase its base diameter and circumference while decreasing in elevation. When the force is released, the frusto-conical section will return to its original dimensions due to the resiliency of the plastic material and the pleating or corrugations in the side wall. The same action takes place in the egg cell causing annular radius 124 to increase its circumference and push out the side wall of the cup slightly. It is noted however that the overall dimension of the package is substantially constant while the cell dimensions are variable since the web is the hinge point for the cups and the movement of the side walls causes an insignificant variation in the height of the cells 120.

It will be seen from an examination of FIGS. 14 to 19 that the contractions and expansions of the annular radius 124 provides a spring-like action, which together with the fan-like action of the frusto-conical end wall element 123A resiliently supports the eggs enclosed within the cells 120 at their end sections.

A presently preferred embodiment of this invention is illustrated in FIG. 20, wherein an egg is resiliently supported in the vertical plane by resilient side wall panels 22B circumferentially spaced between structural formations or ribs 22A. The egg is resiliently supported against rattling by tear drop recesses 35 of the cups in section A. As best seen in FIG. 19 the cups 30, of section A, enclosing the large end of an egg, comprise an entrance portion 21 having a peripheral series of recesses 35 and flat surfaced triangular elements 36 interposed between the pointed or small ends of recesses 35. The remaining portion of cup 30 comprises a circumferentially extending series of connected flat strips or panels 37, extending into annular radius 24 and terminating in a recessed end wall or disk 38. For the purpose of stacking the egg packages, as illustrated in FIGS. 8 and 9, the

diameter of disk 38 is substantially equal to the outside diameter of end wall 23 of the cup of the corresponding bottom section B. It is noted that cells 30 of FIGS. 11 and 20 are similar with the exceptions that the cups of FIG. 20 are of equal height and the strips 37 are spaced from the egg shell, unlike corrugations 32 of FIGS. 11 and 12. Only the recesses 35 of entrance portion 21 engage the enclosed egg which eliminates the possibility that extra large eggs may bulge the side wall of the cups enclosing the large end of such eggs. It will be appreciated that when the side wall is bulged outwardly by an extra large egg, the overall height of the enclosing egg cell will be shortened and the packages will not stack properly.

It should be noted that the package constructed in accordance with this invention may be easily assembled by the egg farmer himself with the use of a simple mechanical press into which the top and bottom sections are inserted. When the bottom tray is filled with eggs, the top section is pressed into contact with the tray and the two sections are sealingly affixed by the adhesive which was applied to the contact surfaces 116. The resultant package is air-tight insuring farm fresh eggs for the consumer which have been housed in a shock absorbing package in transit. Further, the package is transparent for ease in inspecting its contents and expandable to accommodate various sized eggs.

While I have shown and described preferred embodiments and various modifications of my invention, it will be obvious to those skilled in the art that further modifications may be made without departing from the spirit of the invention. Therefore, the above description is

intended only to illustrate various features and advantages of the invention defined by the appended claim.

I claim:

An egg package comprising first and second complementary sections of thermoplastic material, each said section having stiffening rib means comprising a web, a plurality of generally cup shaped members protruding laterally from each said web at one side thereof, said members in each said section protruding in opposite directions, each said cup shaped member having a side and end wall, the side wall of a first plurality of cups protruding from one section comprising inwardly inclined circumferentially spaced longitudinal stiffening rib means and alternating inwardly curved flexible panel means whereby an egg enclosed within said cup is engaged at its small end by said panel means and resiliently suspended within said cup; the side wall of a second plurality of cups comprising an entrance portion having a series of tear drop shaped recesses to engage the egg at its large diameter to prevent lateral movement of said egg and a frusto-conical member having a series of connected flat strips forming the side wall of said frusto-conical member.

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