United States Patent

Commisso

[15] **3,648,916**

[45] **Mar. 14, 1972**

[54] **CARTON**

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[73] Assignee: **Mobil Oil Corporation**

[22] Filed: **Feb. 27, 1970**

[21] Appl. No.: **15,108**

[52] **U.S. Cl.** .....**229/2.5**, 229/44 R, 229/45

[51] **Int. Cl.**.....**B65d 1/26**

[58] **Field of Search**.....229/2.5, 44 R, 45

[56] **References Cited**

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3,215,326	11/1965	Despres	229/2.5
3,337,110	8/1967	Commisso et al	229/2.5
3,563,446	2/1971	Lake et al.	229/2.5
3,519,192	7/1970	Bixler	229/44
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3,163,312	12/1964	Chaplin	217/26.5

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Assistant Examiner—Johnny D. Cherry

Attorney—Oswald G. Hayes, Andrew L. Gaboriault and James D. Tierney

[57] **ABSTRACT**

A disposable carton formed of low cost material and adapted for the packaging of eggs and the like is formed with coacting elements of a cover and latching flap which, in combination, afford rigidity to those elements, guide the coacting elements on closure and provide for a secure latching susceptible of easy opening. Matching wedge shaped recesses are provided in cover and latching flap for guidance and rigidity. Latching is accomplished by a detent extending inwardly from the cover to engage a latching bar of the flap.

11 Claims, 13 Drawing Figures

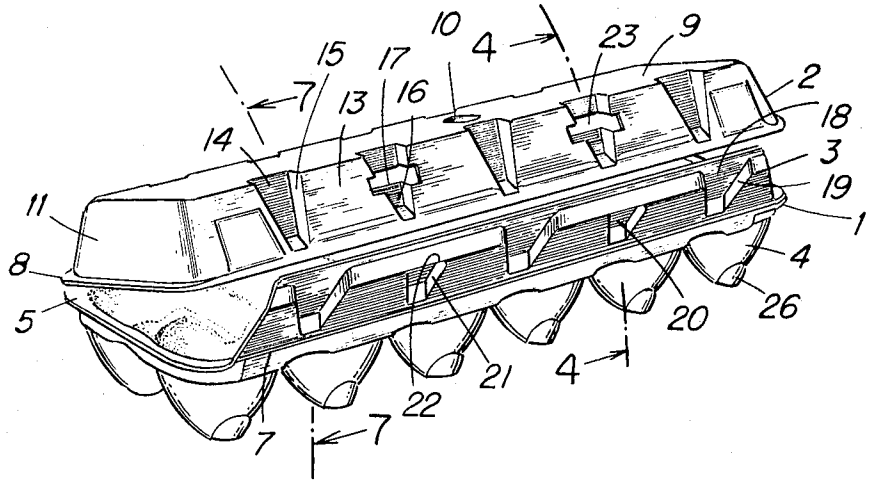


FIG. 1

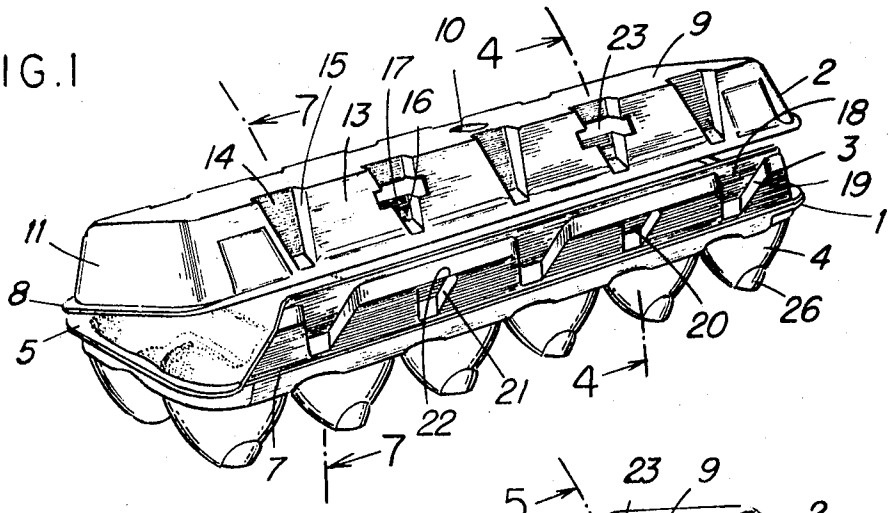


FIG. 2

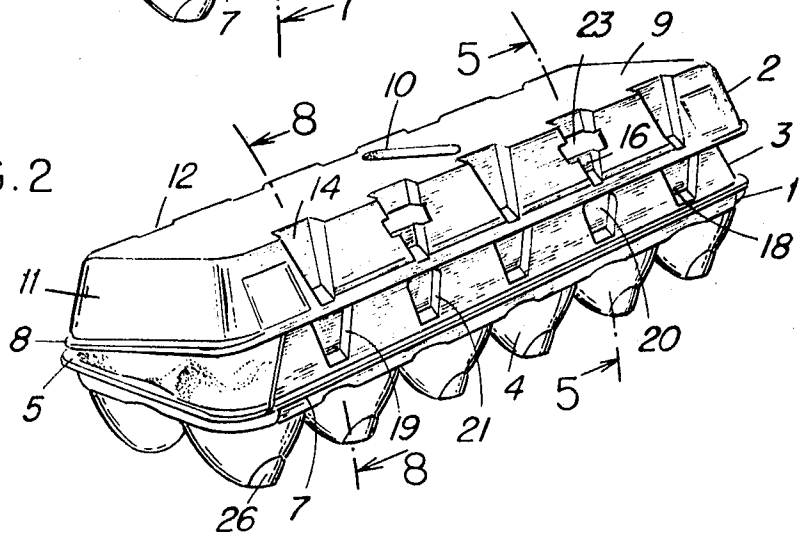
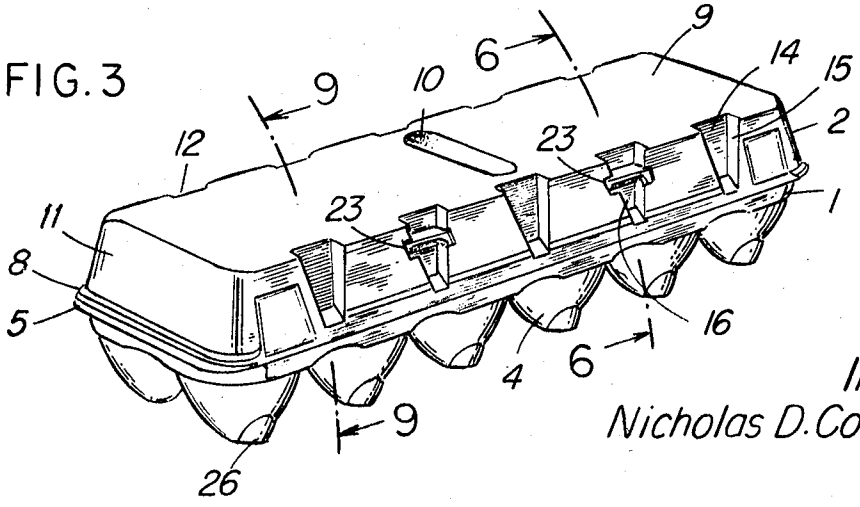


FIG. 3



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FIG. 4

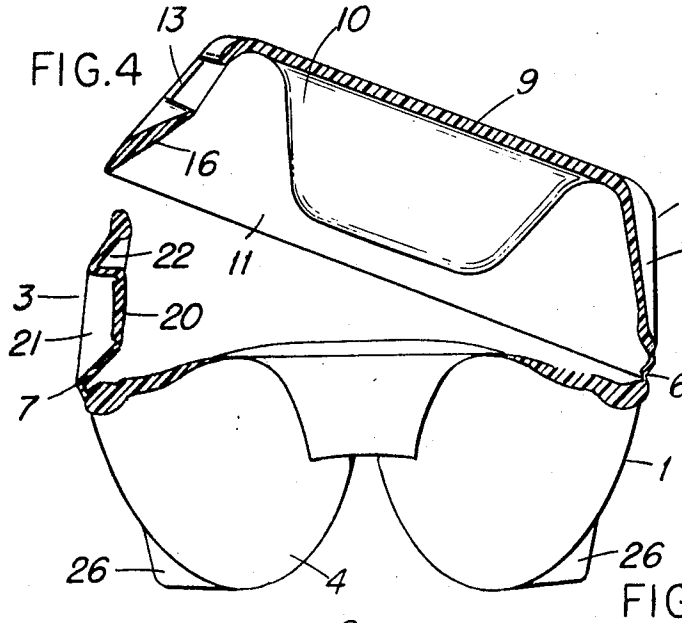


FIG. 5

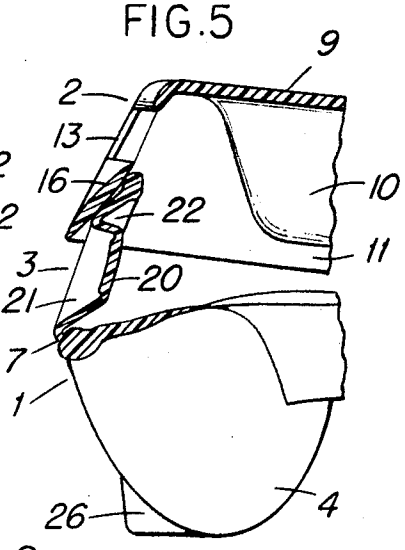


FIG. 8

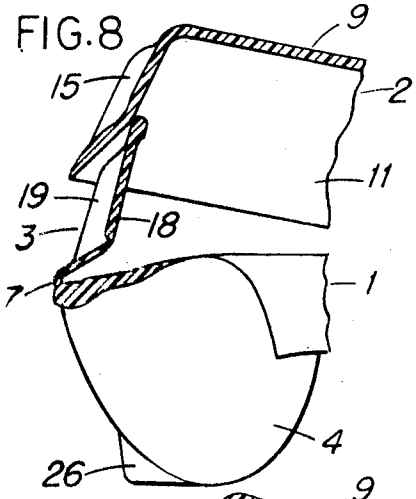
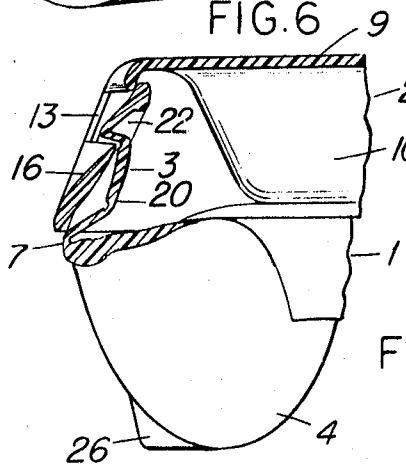


FIG. 6



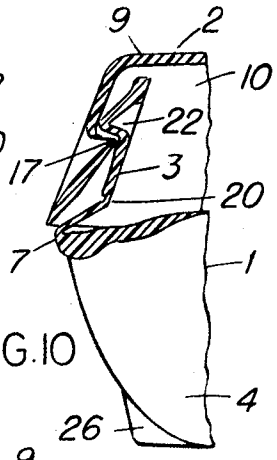
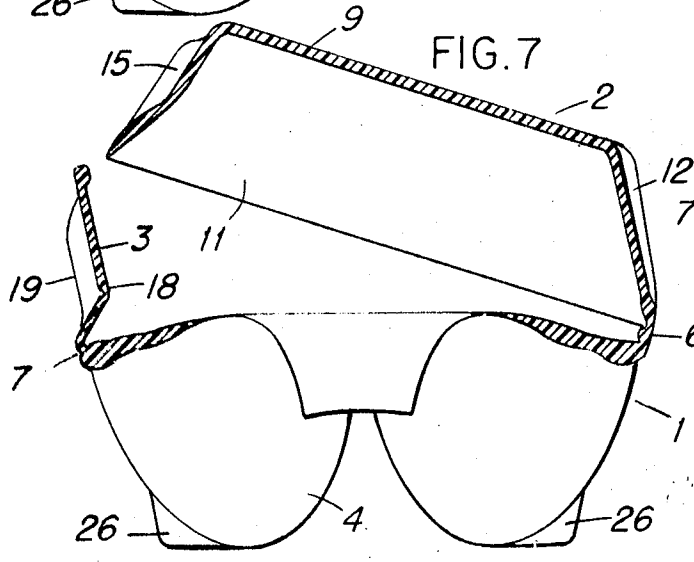


FIG. 10

FIG. 7



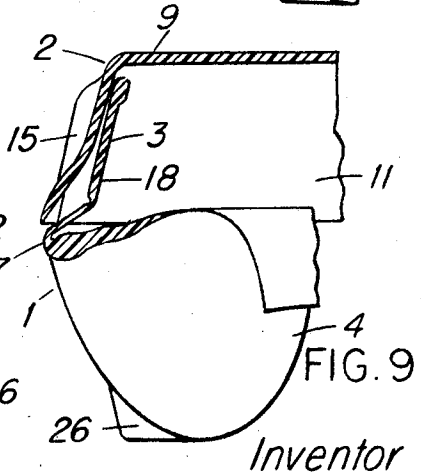


FIG. 9

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FIG. 12

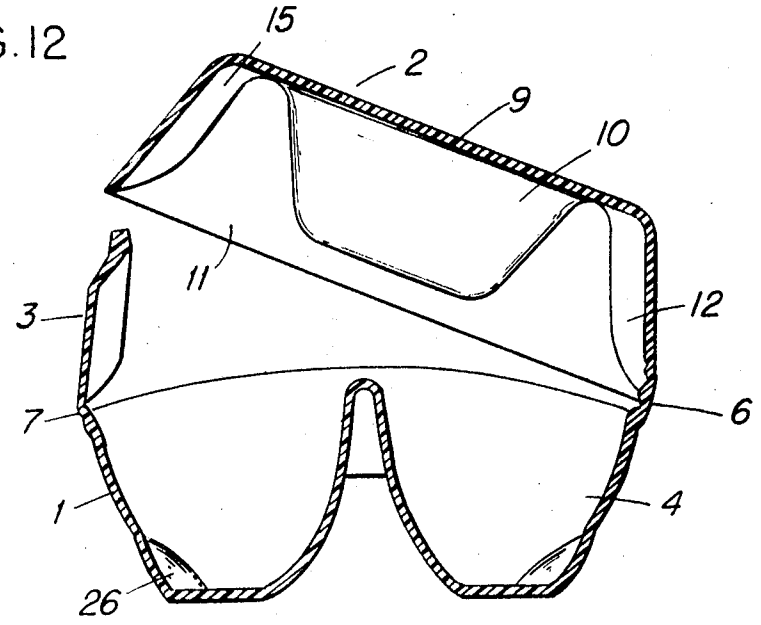


FIG. 11

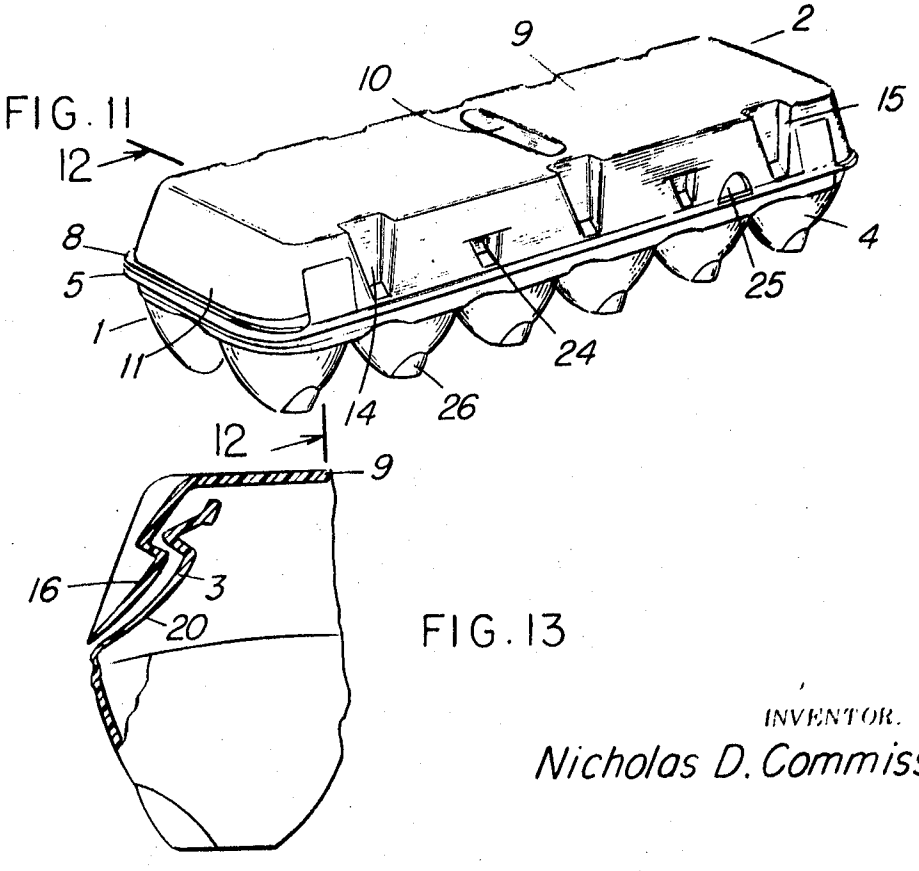


FIG. 13

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CARTON

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is concerned with disposable cartons for packaging such merchandise as eggs and characteristically comprises a bottom tray portion formed to provide cells for the packaged goods, a top cover portion hinged to the rear of the tray and a latching flap hinged to the front of the tray. The latching flap is adapted to coact with the cover for retention of the closure. More particularly, the invention concerns novel structure of the cover and latching flap to assure proper alignment on closing by automatic closure machinery and to afford rigidity to the elements; all in combination with a novel detent and latching bar integrally formed with the cover and flap.

2. Description of the Prior Art

Egg cartons of this general type have been common for many years. An early type is shown by Cox U.S. Pat. No. 2,517,465 in which the latching flap is exterior of the cover and provided with tabs insertable into slots in the front face of the cover. Cartons of the same general nature but having an inner latching element are shown by Schilling U.S. Pat. No. 2,600,130 in which the latching flap is extended to provide upper cells intended to afford greater protection to the packaged eggs. Schilling provides a friction type latch in which a protrusion in front of the flap engages a matching recess in the cover.

Many attempts have been made to improve on the Schilling carton by different specific configuration of latching mechanisms. Most of the subsequent development has eliminated the extension of the latching flap as an unnecessary precautionary structure, it being found that eggs supported in properly designed cells of the tray suffer little breakage during transit under any reasonable handling without the positive cell structure in an upper part of the carton.

For the most part, egg cartons are today filled and closed on automatic machinery which imposes certain restrictions on acceptable structures. A further restraint on acceptable structures is imposed by the characteristics of the material from which the carton is formed. Most such cartons are prepared on molding machinery from either wood pulp or thermoplastic material and the structure must be such that it can be formed from these inexpensive materials at high speed and readily stripped from the molds. Each of the two types of material (pulp and thermoplastic) and the types of equipment on which these may be formed has its own idiosyncrasies to which the carton structure must accommodate.

Much of the effort toward design of molded egg cartons has been concerned with adaption to molding machines, materials and techniques and to the demands of automatic filling and closing machinery.

A typical prior art improvement on the Schilling carton is shown by Reifers U.S. Pat. No. 2,990,094, provided with a latch having a protrusion on the outward face of the latching flap which enters into and engages the edge of a hole in the face of the cover. An outstanding character of this structure is that the protuberance of the flap extends downwardly when the carton is in extended position, as it exists in the mold, thus, facilitating formation of the protuberance in molding machinery. A sloping face of the cover makes it easy to strip from the mold a cover having a hole therethrough. It is a characteristic feature of the Reifers' carton that the front surface of the cover has a high degree of flexibility necessary for proper latching and closure.

A somewhat different improvement of Schilling appears in Despres U.S. Pat. No. 3,215,326 which utilizes a rigid front face of the cover and provides "bridge" elements in each of the cover and latching flap to engage in cavities of the other of these two coacting elements. A further modification of Schilling appears in Andrews U.S. Pat. No. 3,465,947 formed with re-entrant engaging surfaces on cover and flap to provide a positive latch of high security, but requiring special molding techniques to achieve the under-cuts in the elements.

SUMMARY OF THE INVENTION

The improvement on Schilling's structure, characterizing this invention, involves a combination of coacting elements in the front surface of the cover and in the latching flap capable of rapid and efficient formation on automatic molding machinery and affording significant advantages in filling, closing, shipping, marketing and household storage. The front of the cover and the latching flap are provided with complementary recesses extending inwardly from the front of the carton and each defined by relatively flat recess surfaces connected to the front primary plane of each element (cover and flap) by webs essentially planar in nature and sloping sharply toward the recessed surface. This combination of webs and planes set at angles to each other provides a beam effect imparting a high degree of rigidity and strength to these elements. The complementary nature of the recesses and the relatively great number employed, also act for guidance in closing of the carton as it contacts the closing members on automatic machinery. Such closing members tend to twist the elements engaged thereby, an effect counteracted by the complementary recesses, unobstructed by latches.

The latching elements are provided in partial recesses having superficial resemblance to the guidance and strengthening recesses, but obstructed by latching elements which interfere with these recesses acting with full effectiveness for guidance purposes.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the annexed drawings wherein

FIGS. **1**, **2** and **3** are perspective views of one form of the carton in varying stages of closure;

FIGS. **4**, **5** and **6** are sections along the lines **4—4**, **5—5** and **6—6** of FIGS. **1**, **2** and **3** respectively, illustrating how the latch element engages upon closure;

FIGS. **7**, **8** and **9** are sectional views on lines **7—7**, **8—8** and **9—9** of FIGS. **1**, **2** and **3** respectively, illustrating the manner of coaction of the guidance recesses;

FIG. **10** illustrates a form of the invention in which the latching mechanism is entirely shielded in the closed carton;

FIG. **11** illustrates in perspective a closed carton embodying the modifications shown in FIG. **10**;

FIG. **12** is a sectional view on line **12—12** of FIG. **11** illustrative of the inner configuration of egg cells; and

FIG. **13** is a fragmentary cross-sectional view of a modification of the latching arrangement illustrated in FIGS. **10** and **11**.

DESCRIPTION OF PREFERRED EMBODIMENTS

As shown in the drawings, the carton is constituted by a bottom tray portion **1**, a cover **2**, and a latching flap **3**. The tray portion is formed to provide a plurality of cells **4** for reception of eggs and the like molded integrally with dividing surfaces and an upper flange **5** which may lie wholly in one plane. The cover **2** is formed integrally with the tray **1** and connected thereto by a portion of reduced thickness **6** constituting a hinge.

Similarly, the latching flap **3** is formed integrally with the tray **1** and connected thereto by a line of reduced thickness **7** constituting a resilient hinge.

As formed in a mold, the three portions of the carton are in their greatest extended position such that the flange **8** of the cover lies in the same plane as flange **5** of the tray and the latching flap **3** lies extended out to the other side of the carton as formed. This imparts to the hinges **6** and **7** a bias toward extended position.

With particular reference to the cover **2**, this is constituted by an upper surface **9** which, in the embodiment shown, is essentially planar except for a recess **10**, essentially as shown. Molded integrally with the top surface **9** are side walls **11**, a back wall **12** and a front wall **13**. Formed in the front wall are recesses constituted by depressed surfaces **14** and webs **15** of a

structure such as to impart to the front wall a high degree of strength and rigidity capable of supporting burdens of cartons stacked one above another and of maintaining alignment of the front surface for efficient action of the latching mechanism also characteristic of this invention. The latch elements of the cover are constituted by detents **16** formed of recessed surfaces and webs similar to those of the guiding elements, but terminating in a free edge **17**.

Formed in the latching flap are recesses constituted by recessed surfaces **18** and webs **19** complementary to the recesses in the cover. It will be noted that the cover recesses and the flap recesses are wedge shaped and complementary in form. This structure assures that these guidance elements shall become engaged after cover is rotated into closed position and that as the flanges **5** and **8** approach contact, the complementary recesses fit snugly together and assure positive latch engagement.

The latching element of the latching flap is constituted by a recess similar, but shorter in extent, than those which impart strength and guidance. A recessed surface **20** is connected to the main body of the flap of webs **21**. The essentially wedge shaped recess terminates short of the upper edge of the flap to provide a latching bar **22** above the recess. Upon rotation of the cover to close position, the detent **16** enters into the recess bounded by webs **21** and detent edge **17** engages the latching bar **22**. This manner of closure is more fully illustrated in FIGS. **4**, **5** and **6** showing how the rigid face of the cover presses the latching flap rearward against its resilient hinge until the latch elements are engaged, as in FIG. **6**.

The embodiment shown in FIGS. **1** through **9** is characterized by a recess in the latching elements of the cover fully extending to the upper surface of the cover. These are readily formed by molding elements similar to those which form the guidance recesses. The detent is readily formed by cutting from such a recess a rectangular portion of the structure indicated generally at **23**. This embodiment of the invention is readily formed on automatic thermoforming machinery followed by a cutting operation.

An embodiment quite different in appearance, but identical in coaction of its elements, is illustrated in FIGS. **10** and **11** wherein the recess to provide detent **16** is not continuous to the top of the cover. By comparison of FIGS. **6** and **10** it will be seen that the only difference is that the latch is covered in the embodiment of FIGS. **10** and **11** when the carton is closed. A carton of this latter type is preferably formed by a thermoforming operation which molds the guidance and rigidity recesses followed by an operation of cutting a slit **24** in the face of the cover and depressing a portion below that slit to form the detent.

Another specific embodiment of the carton locking arrangement of the present invention, quite similar to that illustrated in FIGS. **10** and **11**, is illustrated in the fragmentary cross section of the locking arrangement shown in FIG. **13**. It will be noted that detent **16** as illustrated in FIG. **13** has been formed so as not to protrude inwardly to the extent of the inward protrusion of detent **16** illustrated in FIG. **10**. It has been found that such an arrangement improves the nestability of such cartons whereby they may be more easily nested one within the other.

It is often found desirable to afford means for depression of the latching flap. In the embodiments of FIGS. **1** through **9** this is available by the exposure of the latching bar **22**. Since that bar is hidden in the embodiments of FIGS. **10**, **11** and **13**, a cutout portion **25** of the cover serves the same purpose.

To provide stability of the carton when set on a flat surface, it is preferred that the bottom outward portion of the cells **4** be provided with feet **26**. Details of this structure appear in FIG. **12**.

Among some of the types of plastic materials which are suitable for fabrication into the carton structures of the present invention are polyolefins such as polyethylene, polypropylene, and polybutene; polystyrene; high impact polystyrene; polyurethane; polyvinylchloride and others. A particular material which has been found to be well suited for fabrication of the present carton structures is foamed polystyrene. The closed cell structure of the foamed polystyrene is a material which rapidly reaches equilibrium with atmospheric moisture and therefore exerts no drying effect. The foam material itself extremely light weight permitting ease of handling and transport.

As hereinbefore indicated, a preferred material employed in the formation of the carton structures of the present invention is plastic and in particular foam thermoplastic materials and especially polystyrene foam. The polystyrene foam may be manufactured utilizing any one of the number of conventional extrusion techniques, for example, extrusion of foamable polystyrene beads, i.e., beads which have a blowing agent already incorporated in them prior to delivery to an extrusion apparatus or, for example, by direct injection extrusion techniques wherein a foaming agent is added to a molten mass of polystyrene contained within an extruder prior to extrusion thereof from a die orifice. See U.S. Pat. No. 3,444,283, Carlson.

After the polystyrene foam sheet material has been produced utilizing conventional extrusion techniques as discussed above, it may be molded to form the carton structures of the present invention. In general, it is desirable to preheat the formed polystyrene sheet before it is molded in order to assure that the sheet will be at a sufficiently elevated temperature to permit rapid forming of the desired structure in the mold.

After preheating the formed polystyrene foam sheet, the cartons of the present invention may be conveniently formed utilizing a molding operation such as match molding, for example.

The process employed for forming the cartons may best be understood by a description of a specific embodiment as illustrated in the following example, however, such a description is solely for purposes of illustration and is not to be construed in a limiting sense. For example, the following embodiment sets forth rather specific process and operating conditions employed when preformed polystyrene foam is employed as the starting material for the structure and, of course, such conditions will normally vary when other plastic materials are employed.

EXAMPLE I

A preformed sheet of polystyrene foam material with an average density of about 7 pounds per cubic ft. and approximately 110 mils thick was fed into a radiant preheat oven and heated to a temperature of approximately 225° F. Upon emerging from the preheat oven, the polystyrene sheet was approximately 200 mils thick as a result of the expanding action of the residual blowing agent, in this case pentane, which remains entrapped within the polystyrene cells after it is extruded. The residence time of the polystyrene in the oven was approximately 5 to 20 seconds and the average line speed was about 15 ft. per minute. Immediately upon emergence from the preheat oven, the polystyrene foam sheet passes into a forming mold. The thermoforming mold employed is essentially a temperature controlled female mold maintained at about 150° F. and a lower male forming member maintained at a temperature of about 100° F. As the match mold is cycled, the upper and lower mold members are brought together forcing the heated polystyrene foam to assume the configuration of the mold members.

The shape of the molds and of the freshly molded carton is essentially that shown in FIG. **1** except that rectangular opening **23** has not been cut. As formed, the cover and flap in extended position as would appear on rotation of elements in FIG. **1** is as follows: the cover is rotated to the left to a position in which flange **8** lies in the same plane as flange **5** and the flap is rotated to the right until it also lies in that same plane.

Rectangular opening **23** is formed by a second operation in which the carton cover **2** is supported against a surface having

a suitable die orifice and the openings **23** are cut out by punches.

In an alternative type of operation, the openings **23** may be formed in the mold by providing reciprocating elements in the female part of the mold which punch out the opening. Similar elements are used to form the embodiment shown in FIGS. **10** and **11**. It will be immediately apparent that a female mold of fixed configuration which will form the recessed surfaces and webs of detent **16** would have a portion overlying that part of the front wall of the cover immediately above the detent **16**.

Alternatively to forming the detent **16** in the embodiments of FIGS. **10** and **11** by a separately moving element in the mold, the freshly formed carton without such detent may be transferred to a second stage at which the slit **24** is cut and the heated element of suitable shape pressed against the carton to depress a portion under the slit, forming the detent **16**.

Although the present invention has been described with preferred embodiments, it is to be understood that modifications and variations may be resorted to, without departing from the spirit and scope of this invention, as those skilled in the art will readily understand. Such variations and modifications are considered to be within the purview and scope of the appended claims.

I claim:

1. In a carton adapted for the packaging of eggs and the like having

1. a bottom tray formed to define a plurality of cells for reception of packaged articles and of a depth such that said articles are enclosed thereby for a portion less than their vertical dimension as packaged,
2. a dished cover resiliently hinged to the rear upper edge of said tray and having a front wall, a back wall, and end walls fixed to each other and to a top for said cover, all of such dimensions that the packaged articles are substantially enclosed within the edges of said tray, said front wall lying primarily in a plane sloping inwardly toward said top, and
3. a latching flap hinged to the front upper edge of said tray by resilient means biasing said flap toward a position outward of vertical from said front edge; said cover and said flap having coacting means associated therewith capable of engagement upon closure of the carton in a manner to maintain such closure;

the improvement which comprises a cover and latching flap of complementary configuration to afford

I. rigidity of flap and front wall of cover,

II. guidance in closure for assurance of proper seating when closed, and

III. positive engagement of latching elements;

said configuration being characterized by:

a. at least one recess in said front wall defined by a wedge portion extending to and tapering outwardly toward the top of said cover and spaced inwardly from the primary plane of said wall, and rigidity-imparting webs connecting said wedge portion with the main body of said front wall lying in said primary plane,

b. at least one detent in said front wall defined by a wedge shaped configuration similar in form to said wedge portion in its portion remote from said top and terminated by an edge intermediate said top and the lower edge of said front wall, and

c. at least one recess in said flap complementary to said recess in said front wall and similarly defined by wedge portion and rigidity imparting webs whereby the cover is guided on closure, and

d. at least one such recess in said flap complementary to said detent and terminated short of the upper edge of said flap by a latching bar extending along said edge and positioned in the primary plane of said flap arranged and adapted for contact with said detent on closure to depress the flap against resilience of its hinge and for engagement of said detent upon completion of closure.

2. A carton according to claim **1** having said detent formed by removal of a section of said wedge portion of structure like said recess.

3. A carton according to claim **1** having said front wall of the cover continuous and lying in the primary plane thereof above said detent.

4. A carton according to claim **1** having a plurality of said recesses spaced along the front wall of said cover.

5. A carton according to claim **4** having said detent spaced between two of said recesses.

6. A carton according to claim **5** having three said recesses and two said detents.

7. A carton according to claim **6** constituted of foamed polystyrene.

8. A carton according to claim **1** constituted of a foamed thermoplastic resin.

9. A carton according to claim **1** constituted of foamed polystyrene.

10. A carton according to claim **1** having three said recesses spaced along the front wall of said cover.

11. A carton according to claim **1** wherein said cells in said carton bottom tray portion are characterized by having integrally formed protrusions projecting outwardly from said cell base positioned at the base portion of said cells whereby said protrusions function as cell-feet to provide carton stability.

* * * * *