May 5, 1953 J. W. COX 2,637,479

EGG CARTON

Filed March 28, 1947 3 Sheets-Sheet 1

Fig. 1.

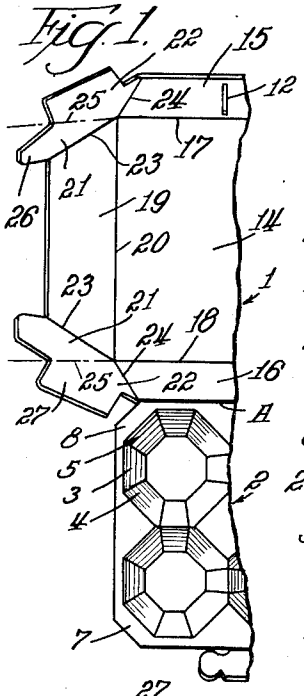


Fig. 3

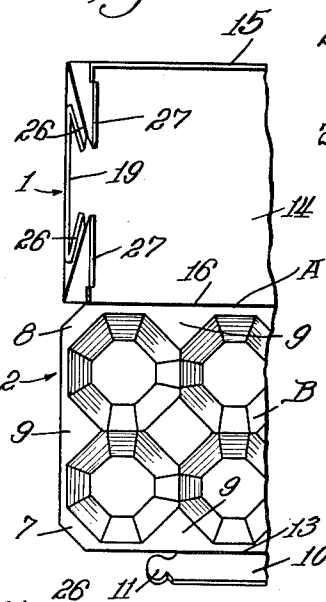


Fig. 4

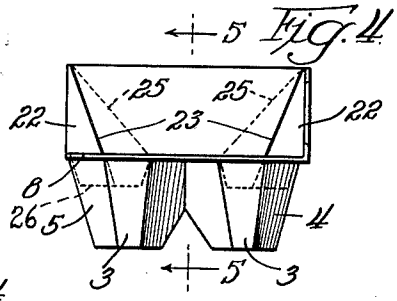
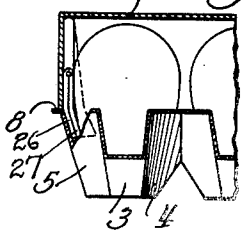


Fig. 5.



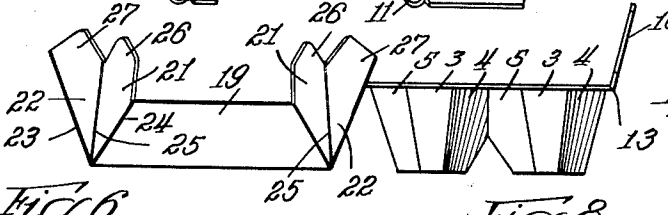


Fig. 2.

Fig. 6.

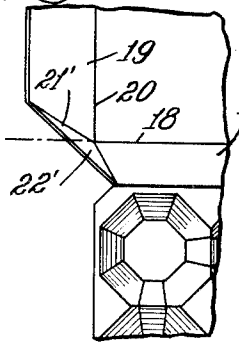


Fig. 8

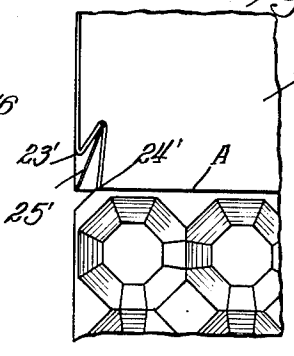


Fig. 9

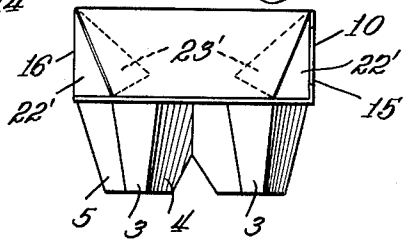
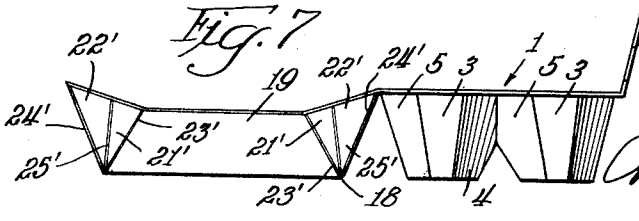


Fig. 7



INVENTOR.
John W. Cox
BY
Cromwell, Greist & Warden
Attys

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Fig. 10.

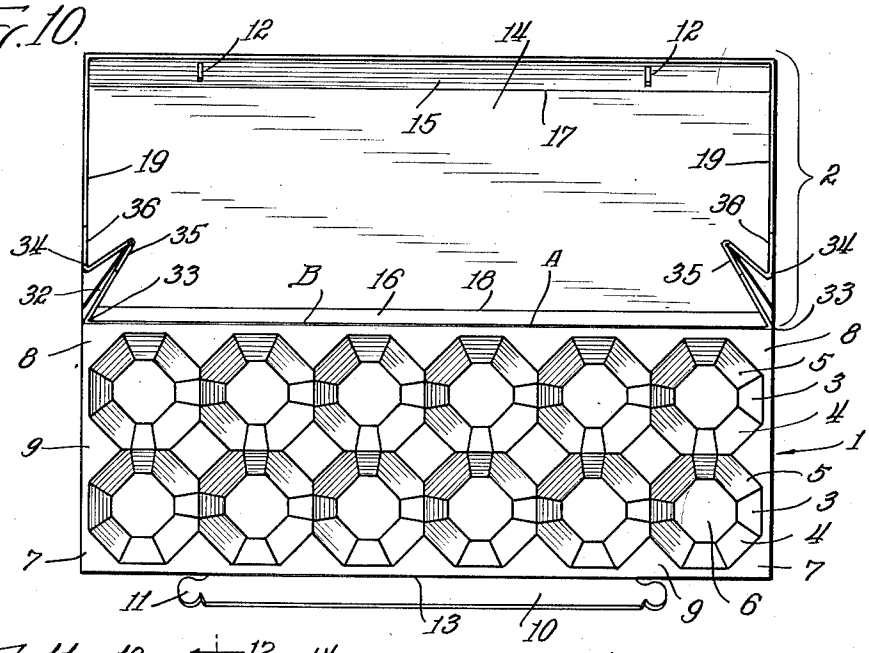


Fig. 11.

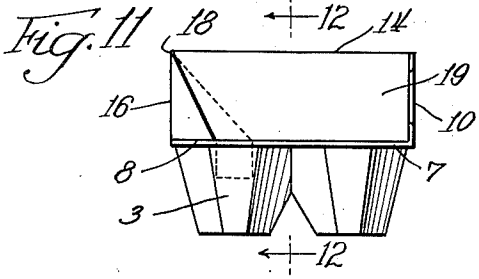


Fig. 12.

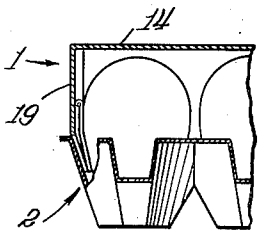


Fig. 16.

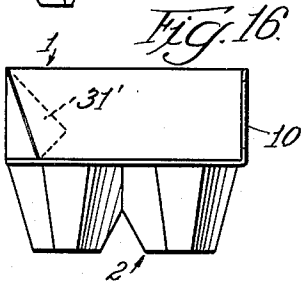
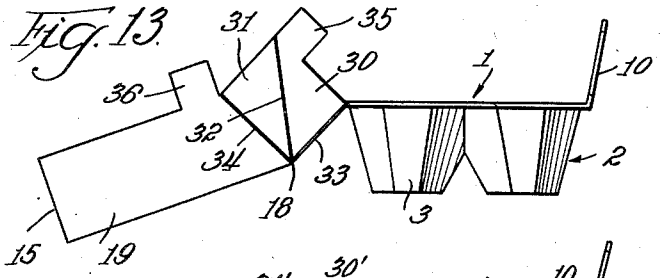


Fig. 13.



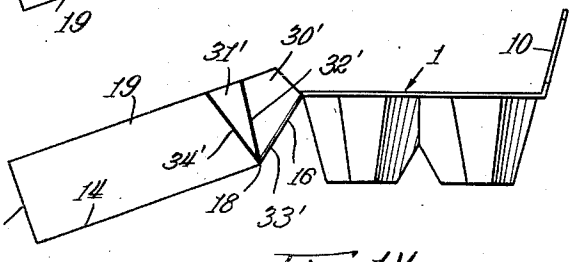
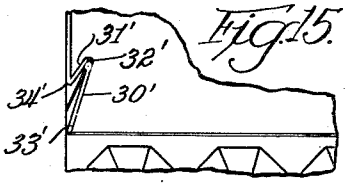


Fig. 14.

Fig. 15.



INVENTOR.

John W. Cox

BY

Cromwell, Greist & Warden

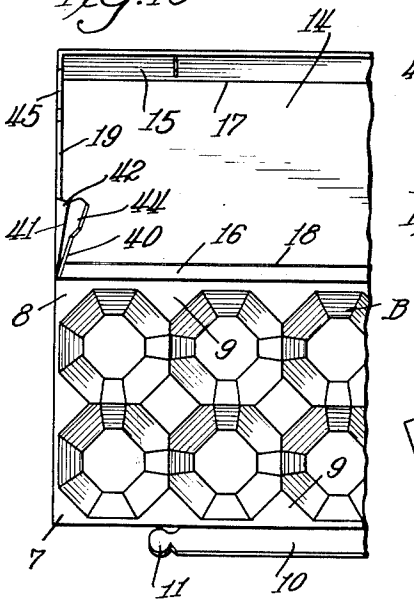
Attys

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EGG CARTON

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Fig. 18



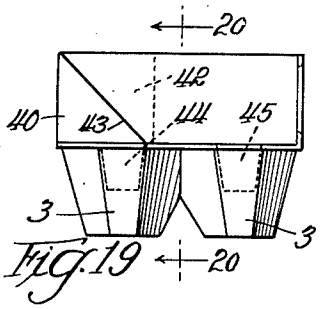


Fig. 19

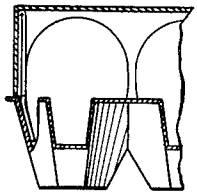


Fig. 20

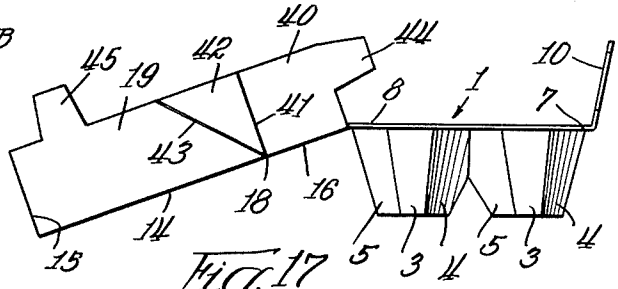


Fig. 17

Fig. 21.

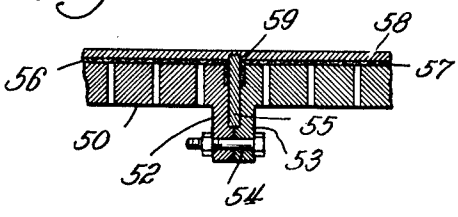
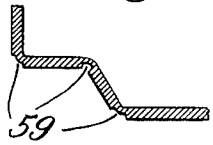


Fig. 22



INVENTOR.
John W. Cox
BY
Cromwell, Dreist & Warden
Att'ys

Patented May 5, 1953

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UNITED STATES PATENT OFFICE

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EGG CARTON

John W. Cox, Chicago, Ill., assignor to Shellmar Products Corporation, Chicago, Ill., a corporation of Delaware

Application March 28, 1947, Serial No. 737,892

1 Claim. (Cl. 229—2.5)

1

This invention pertains to improvements in molded pulp cartons, in particular those adapted for the packaging of eggs, and is generally related to the subject matter of my copending application on Molded Pulp Cartons, Serial No. 737,891, filed March 28, 1947.

Egg cartons fabricated of molded fibrous pulp material have received considerable commercial acceptance of recent years; however, in many instances such cartons are found to be lacking in suitability to contain eggs of large size. This is due to the angularity of the walls of the usual rigid carton cover and bottom section, and results in the formation of a cover section having no greater internal capacity than the bottom section.

Since eggs are uniformly packed in cartons with their large ends up, it is obvious that if the bottom section of the carton is proportioned to properly contain the small ends of eggs, the cover section, of no greater capacity than the bottom section, will crowd the tops of the eggs, rendering it impossible to properly close the carton. This factor contributes largely to breakage of the eggs. If the porportions of the cover section are substantially changed for greater internal capacity, the bottom and cover sections will not meet properly in marginal abutment in the closed position thereof, under ordinary principles of design.

The method found to be most economical and satisfactory for the manufacture of molded pulp articles usually includes the steps of immersion of a foraminated simple die shaped to the form of the article in a slurry of pulp, the application of vacuum to deposit on the die a layer of pulp of desired thickness, and the transfer to a drying form of the material deposited on the die. It will be obvious that the material on the die still contains a high percentage of water at the time of its transfer, in consequence of which it is sleazy, and often tends to adhere to the die. Experience has shown that in manufacturing molded pulp articles, in which upstanding portions such as walls, partitions and the like must be formed, it is imperative that the walls of these upstanding portions be formed at a considerable slope or angle to the vertical. If this is not done, the removal of the molded article from the die without damage thereto is almost impossible.

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Hence, if the angularity of the rigid side and end walls of the cover section is altered to a more upright position in order to obtain greater internal cover capacity, the cover section is not readily removed from the molding die without damage.

Moreover, for satisfactory and economical shipment and storage molded pulp cartons must be nestable, and in general, cartons which have their walls or other upstanding portions formed or positionable at an angle sufficient to permit ready removal from the forming dies have this desirable nesting characteristic.

The size and configuration of the egg containing cells of the bottom portion of molded pulp egg cartons have been fairly satisfactorily established, and the present invention resides in the provision of a cover section which has sufficiently greater internal capacity than the bottom section to properly contain the large ends of eggs packed therein, yet which employs a bottom section of established capacity and which may be molded in such a manner as to generally present angular surfaces to the die face for easy removal of the entire article from the die, and subsequent nesting. Moreover, the present carton improvements include the feature of a cover section which will fold over the bottom section into covering relation thereto with the cover section walls meeting those of the bottom section in marginal supported abutment when the carton is filled and closed.

The general purpose and object of this invention is therefore to provide a molded pulp carton, comprising a bottom having outwardly and upwardly disposed sides, and a cover section integrally attached thereto which is moldable with its parts so angularly positioned as to permit its ready removal from the die, thereby being rendered easily nestable, and in which the cover section is so formed as to be swingable to covering relation to the bottom section and in marginal abutment with the bottom section walls, yet having considerably greater internal capacity than the bottom section.

A further and specific object of the invention is the provision of a carton of the described class in which the cover section walls are swingable to a position of greater verticality in the closed than in the open position of the carton sections.

A still further specific object of the invention

is the provision, of a carton of the type indicated, in which there are gussets in the corners of the cover section which permit the cover section to be manufactured and nested with certain of its walls in outwardly divergent relation, the corner gussets being inwardly foldable to permit the cover section to swing to marginally abutting, covering relation to the bottom section, and with the walls of the cover section in a vertical position or tending substantially toward the vertical.

The foregoing statements are indicative in a general way of the nature of the invention, but other and more specific objects will be apparent to those skilled in the art upon a full understanding of the construction and operation of the device.

Various embodiments of the invention are presented herein for purpose of exemplification, but it will be appreciated that the invention is susceptible of incorporation in other modified forms coming equally within the scope of the appended claim.

In the drawings,

Fig. 1 is a fragmentary plan view of a carton in accordance with one form of my invention, wherein the certain characteristic gussets are positioned at the four corners of the cover section, illustrating the cover in open, spread-out condition;

Fig. 2 is an end elevation of the carton of Fig. 1 as it appears when shipped to customers;

Fig. 3 is a fragmentary plan view of the carton of Fig. 1, showing the gussets in an infolded, compressed or collapsed position, which they assume when the cover is appropriately manipulated and brought over into covering relation to the bottom section;

Fig. 4 is an end elevation of the carton of Fig. 1 as it appears when closed;

Fig. 5 is a fragmentary cross-sectional view taken substantially along line 5—5 of Fig. 4;

Fig. 6 is a fragmentary plan view of a modified form of the invention characterized by the omission of the downward extension of the cover gusset engageable with the bottom section;

Fig. 7 is an end view of the carton of Fig. 6 in the open position of the sections;

Fig. 8 is a fragmentary plan view of the carton of Fig. 6 showing the manner in which the corner gusset is folded as the cover is rotated to the closed position;

Fig. 9 is an end elevation of the carton of Fig. 6 with the parts in closed position;

Fig. 10 is a plan view of a carton embodying a further modification of the invention, wherein the gussets are positioned at the juncture of the carton rear and side walls, the gussets having a somewhat different configuration and being infolded preliminary to the closing of the cover;

Fig. 11 is an end view of the carton of Fig. 10 in the closed position of the sections;

Fig. 12 is a fragmentary cross section taken substantially on line 12—12 of Fig. 11;

Fig. 13 is an end view of the carton of Fig. 10 in the opened position of the sections;

Fig. 14 is an end view of a modification differing from the form shown in Fig. 13 in that this form lacks the wall or gusset extensions characterizing the embodiment of Fig. 13;

Fig. 15 is a fragmentary plan view of the carton of Fig. 14 showing the one of the gussets in partially infolded position;

Fig. 16 is an end view of the carton of Fig. 14 as it appears when closed;

Fig. 17 is an end view of a modification utilizing a different form of gusset from those forms otherwise shown;

Fig. 18 is a fragmentary plan view of the carton of Fig. 17 with the gusset in partially infolded position;

Fig. 19 is an end elevation of the carton of Fig. 17 as it appears when closed;

Fig. 20 is a fragmentary cross-sectional view taken along line 20—20 of Fig. 19;

Fig. 21 is a diagrammatic view showing a fragment of a typical pulp molding die on which the cartons are made and a typical manner of producing certain weakened fold lines along which the gussets of the invention may fold with respect to adjacent walls and one another; and

Fig. 22 is a diagrammatic view showing how the fold lines appear in the folding of connected carton parts which are made as indicated in Fig. 24.

Referring to the drawings, the molded carton according to the various forms of the invention includes a bottom section, indicated generally by reference numeral 1, to which a cover section, generally indicated by the reference numeral 2, is hinged along one longitudinal side thereof, i. e., at an upper rear wall margin, along a line of fold A. In all forms, the bottom section 1 is divided into a plurality of shaped article receiving cells B by angularly upwardly directed panels, and partitions of entirely conventional type. Reference numerals 3, 3 indicate cell-defining and end wall forming panels conjoined to angularly disposed front and rear side cell forming panels 4, 5 respectively, which panels 3, 4 and 5 extend upwardly from a cell bottom 6 to constitute an end wall for the bottom section, as clearly illustrated in Figs. 2 and 4, likewise in corresponding figures pertaining to the other modifications.

At each front corner bottom section 1 is provided at its top margin with outwardly extending horizontal abutments or shoulders 7 and at each rear corner there are similar shoulders 8. Between adjacent cells, also at the upper wall margins, are inwardly directed horizontal cell connecting webs 9, and these webs 9 cooperate with the shoulders or abutments 7, 8 to form a supporting surface or abutment for the margins of the hereinafter described cover section walls in the closed position of the sections, thus serving greatly to stiffen and reinforce the carton as a whole.

Along its side opposite its hinged connection A with cover section 2, the bottom section carries a locking flange 10 such as that shown in my copending U. S. patent application Serial No. 503,029, filed September 20, 1943. This locking flange 10 has outwardly directed tongues 11 formed at each end thereof which are adapted for locking insertion into cuts 12 formed in the front wall 15 of the cover section. For this purpose, locking flange 10 is swingable along a bend line 13 from an outwardly divergent position to an exterior surface abutting position with relation to cover section front wall 15 when the carton is closed, all as described, and for the purposes set out in said copending application.

Cover section 2 comprises a planar, wall-connecting top panel 14, having the planar front and rear side walls 15, 16 respectively connected thereto along longitudinal bend lines 17, 18, respectively. It also has identical end walls 19 connected thereto along transverse bend lines 20.

As shown in Fig. 1, there are provided in this form identical gussets at the four corners of the

cover section 1, generally in the form of double triangles, which gussets extend diagonally between the cover section end walls 19 and the cover section front and rear walls 15, 16, respectively. The reference numeral 21 designates the innermost gusset forming triangle and numeral 22 indicates the outermost thereof. As shown in Figs. 1 and 2, the apices of the two pairs of triangles 21, 22 coincide with the respective junctures of line 20 with lines 17, 18, their diagonal positioning permitting the front and rear side walls 15, 16 and the end walls 19 all to assume a sharply outwardly divergent angle relative to top panel 14 in the open position of cover section 2. This facilitates stripping from the molding die and enables nesting stacking of the carton covers, all as described above.

The triangles 21 are integrally connected to cover section end wall 19 along fold lines 23, 23, while the triangles 22 are connected to front and rear walls 15, 16, respectively, along fold lines 24, 24, and the triangles 21, 22 are integrally and bendably connected to one another along the fold lines 25 which pass through the apices of the triangles adjacent the top panel 14.

As best shown in Fig. 2, triangles 21, 22 are provided with shaped wing extensions 26, 27, respectively, which, in the open position of the sections, extend well above the cover section wall margins. In the closed position of the sections, these extensions project substantially into the article receiving cell immediately therebelow, as further hereinafter more detailedly described.

As will be apparent and as shown in Fig. 3, triangles 21, 22 are foldable into side-by-side abutting relation to one another along fold lines 25 and are also foldable with respect to cover section end wall 19 along fold lines 23, 23 and with respect to front and rear side walls 15, 16, respectively, along fold lines 24, 24, inwardly of the cover section. The resultant inward positioning of the gussets in this fashion is accompanied by partial rotation of side walls 15, 16 on lines 17, 18 and end walls 19, 19 rotated on lines 20, 20, so that all the cover section walls are brought from the widely divergent positions of Figs. 1 and 2 to a more vertical, or less divergent, position exemplified by Figs. 3 and 4. If desired, triangles 21, 22 may be so proportioned that, in the closed position of the cover, all the walls may be brought to the vertical, as particularly shown in Figs. 4 and 5.

As particularly shown in Figs. 4 and 5, when the carton cover section is in completely infolded and closed condition, one interior surface of gusset triangle 21 is positioned adjacent the inner face of end wall 19, the outer surface thereof being in abutment with the outer surface of triangle 22. Also, in the closed condition of the carton, the gusset wing extensions 26, 27 extend into the cell immediately therebelow, extension 26 positioning adjacent end cell wall panels 3 and extensions 27 positioning adjacent panels 3, 4 at the forwardmost corners and adjacent panels 3, 5 at the rearwardmost corners of the carton. As particularly shown in Fig. 5, when eggs are placed in the several cells, they tend to impinge upon the infolded extensions, inhibiting any tendency such extensions may have to become displaced. It will be noted that the corner shoulders 7, 8 of the bottom section are vertically abutted by the infolded gusset, as shown in Fig. 4, thereby effectively supporting and bracing the cover section against vertical collapse or telescoping. The wing extensions 26, 27 serve also to prevent lateral

shifting of the cover section relative to the bottom section.

A modification of the structure shown in Figs. 1 through 5 is shown in Figs. 6 through 9, the essential differences between the two structures being that the gusset forming corner triangles shown in Figs. 6 to 9 inclusive do not have extensions insertable into the cells of the bottom section, corresponding to extensions 26, 27 just referred to.

In this form the gussets comprise right angled triangular portions, 21', 22', formed diagonally across the cover section corners between side walls 15, 16 and end walls 19. The triangles are connected together along a medial fold line 25' along which they are foldable with respect to one another. Triangles 21' are connected to and foldable inwardly with respect to cover section end walls 19 along fold lines 23', 23', and triangles 22' are foldable with respect to cover section side walls 15, 16 along fold lines 24', 24', as particularly shown in Fig. 8. In the fully infolded position, as when the carton is closed, the triangles assume a position substantially as shown in Fig. 9. The outstanding advantage of the above described modified form may be molded on a simpler and less expensive die than required for the form shown in Figs. 1 through 5, inasmuch as said die need be of no greater depth than that of the side and end walls, as demonstrated in Fig. 7.

Referring now to Figs. 10 through 13, these figures illustrate a further modified form of the invention wherein there is provided only one pair of oppositely positioned corner gussets, located adjacent the junction of a side wall with end walls 19. The shape and positioning of these gussets is such as to permit one side wall (in this case the rear side wall) to be molded at an extreme angle to the top panel of the cover section, and this extreme angularity of the rear wall 16 in turn permits the front cover section wall 15 to be molded, if desired, perpendicular to the top panel. It is apparent that the aforesaid substantial perpendicularity of the front wall does not prevent easy removal of the article from the dies, nor prevent nesting of the made-up carton, due to the formation of the opposed wall at an exaggerated angle to the cover top panel.

Referring particularly to Fig. 10, it will be noted that, unlike the form of Fig. 1, rear wall 16 is the full length of the bottom section 1 along its line of connection to said bottom section, so that the pair of gussets shown therein do not extend diagonally of the corners between the cover section side and end walls, but on the contrary tend to extend in the plane of or parallel to the end walls, when the carton cover section is in its distended, open form.

Regarding specific details of the embodiment of Figs. 10 to 13, the gussets comprise adjacent, but oppositely disposed, right-angled triangles 30, 31 and integrally connected along a fold line 32 at the hypotenuse of each. Triangles 30 are joined to rear side wall 16 of the cover section along fold lines 33, 33 and the triangles 31 are joined to the cover section end walls 19 along fold lines 34, 34. Each triangle 30 has an integral extension 35 formed on its free edge and each side wall has an integral extension 36 formed along its free edge, as shown in Fig. 13.

Triangles 30, 31 are foldable with respect to each other, inwardly of the cover section, along fold lines 32, 32, while triangles 30 are foldable with respect to rear wall 16 along fold lines 33,

38 and triangles 31 are foldable with respect to end walls 19, 19 along fold lines 34, 34, as a result of which cover section rear wall 16 swings along line 18 with respect to top panel 14 to assume a position of greater verticality in relation to such top panel. Extensions 35, 36 fall into abutting register, and in the fully closed position of the sections extend inwardly of the cell therebeneath adjacent bottom section end wall panel 3, substantially as shown in Figs. 11 and 12, with the results discussed in connection with Figs. 1 to 5. An effective bracing engagement of the gusset is had against the corner shoulders 8.

Referring now to Figs. 14, 15 and 16, there is illustrated therein a modified form of the structure which, like the modified form shown in Figs. 6 through 9, has the advantage of being capable of fabrication on shallow dies of relatively low cost, by reason of the fact that the gussets terminate in free edges which, in the open position of the cover section, are in the plane of the free edges of the cover section end walls 19.

In this instance each oppositely positioned gusset comprises triangular portions 30', 31' which are foldable with respect to one another along a fold line 32'. Each gusset is foldable with respect to the cover section rear wall 16 along fold lines 33', 33' and with respect to end walls 19, 19 along fold lines 34', 34'. When completely infolded and when the cover section 2 is rotated into covering relation to the bottom section 1, the triangles assume substantially that position in which they are shown in Fig. 16.

Figs. 17 through 20 illustrate a further modification which features the molding of the carton rear side wall 16 in the plane of the top panel 14 (see Fig. 17), the gussets each comprising a rectangular portion 40 and a triangular portion 42. Like the form of the invention shown in Figs. 10 through 16, this form permits cover section front side wall 15 to be integrally molded substantially perpendicular to top panel 14, yet permitting easy removal from the die and easy nesting by reason of the fact that the extended cover section, particularly wall 15 thereof, normally reposes at an oblique, outwardly divergent angle, substantially as shown in Fig. 17. An additional advantage of this form is that when the rectangular gusset portion is formed in a height equivalent to the width of the end wall, considerable additional resistance is afforded the cover section against deflection under vertical pressure when the carton is closed, said gusset resting on the shoulder 8 to brace the cover.

Referring again to Fig. 17, the generally rectangular portion 40 forming one part of each of the pair of oppositely positioned gussets, and to one edge of which rear wall 16 is integrally molded in a non-folding corner, is foldable with respect to the triangular gusset-forming portion 42 along a fold line 41, and along its hypotenuse the latter is foldable inwardly of the cover section along a fold line 43, which joins said triangular portion 42 to the end wall.

In this embodiment, an outwardly projecting extension 44 is formed along one free edge of rectangular gusset forming portion 40, and along the margin of end wall 19 there is formed a similar outwardly projecting extension 45.

When cover section 2 is shaped into form for rotation into covering relation to bottom section 1, the triangular gusset-forming portion 42 is folded inwardly of the cover section along fold line 43 and rear side wall 16 is swung through an arc of 90° along line 18, while the rectangular gusset forming portion 40 folds along fold line 41 with respect to said triangular gusset forming portion. As previously stated, in the preferred form wherein the height of rectangular gusset-forming portion 40 coincides with the width of end wall 19, the fold line 41 will repose immediately under and support the edge of top panel 14, the rectangular gusset forming portion 40 bracing the sides of the top section, adjacent the gusset, against displacement or distortion under vertical pressures. At its lower edge the gusset engages against shoulder 8, thereby receiving a firm support for the foregoing purpose.

As best shown in Fig. 19, when the carton is closed, extensions 44 extend downwardly inwardly of the cell immediately subjacent thereto in engagement with bottom section end wall portion 3. Extensions 45 on the end wall 19 are similarly positioned in the end cell of a row remote from that in which the above mentioned cell is located and, like the extensions 44, are contacted by eggs in the cell to restrain retraction thereof.

Molded pulp cartons of the type described hereinabove are preferably manufactured on dies such as shown in Chaplin U. S. Patent No. 2,359,201, which comprise plural foraminated die sections having a layer of screen wire superposed thereabove, the edges of the screen wire being clamped between edges of adjacent die sections.

There is shown in section in Fig. 21 a typical fragmentary portion of a Chaplin die such as utilized to mold into a pulp article a weakened fold line such as may be provided, for example, in the gussets described hereinabove.

In Fig. 21 the reference numerals 50, 51 indicate separate foraminated die sections having similar downwardly extending flanges 52, 53 formed integral therewith, through which flanges are provided registering openings to receive a connecting bolt 54. The flanges are recessed, as shown, to receive and hold a narrow bar 55 which extends upwardly a short distance above the surfaces of the die sections 50, 51, and also above screen wire portions 56, 57 which cover the die sections. The reference numeral 58 indicates a layer of pulp deposited by suction on the die. The slight upward extension of bar 55 into layer 58 leaves in the pulp a groove 59 of lesser thickness than the thickness of the remainder of the carton body. This groove is accordingly less rigid than the surrounding material, but possesses adequate strength by reason of a tendency of the pulp fibres to become deposited longitudinally across, or in bridging relation to, such a partial barrier as presented by bar 55, under the influence of vacuum applied adjacent the sides of such bar.

It will be obvious that since articles of the described class are manufactured in an "open-face" die grooves 59 appear on only one surface thereof, but the carton portions adjacent such grooves are readily bendable along such grooves in either inward or outward direction as indicated by the diagrammatic section of part of a carton shown in Fig. 22.

What I claim is:

A molded pulp carton comprising a bottom section having upstanding walls, a cover section hingedly attached to the bottom section and foldable thereover into closing relationship, said cover section comprising a top panel having pairs of opposed walls extending therefrom, gussets integrally molded in two opposed walls of said

cover section at the juncture of said walls and another cover section wall extending angularly therebetween, said gussets permitting at least one of said cover section walls to normally extend at a substantial outwardly divergent angle to said top panel, and being inwardly foldable for swinging of said other wall along its line of juncture with said top panel to a position of greater verticality in the closed than in the open position of the sections, said cover section walls having marginally abutting engagement with the bottom section walls in said closed position.

JOHN W. COX.

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