

Oct. 11, 1960

W. H. INMAN ET AL

2,955,735

COLLAPSIBLE CELLULAR CARTON

Filed Nov. 8, 1957

4 Sheets-Sheet 1

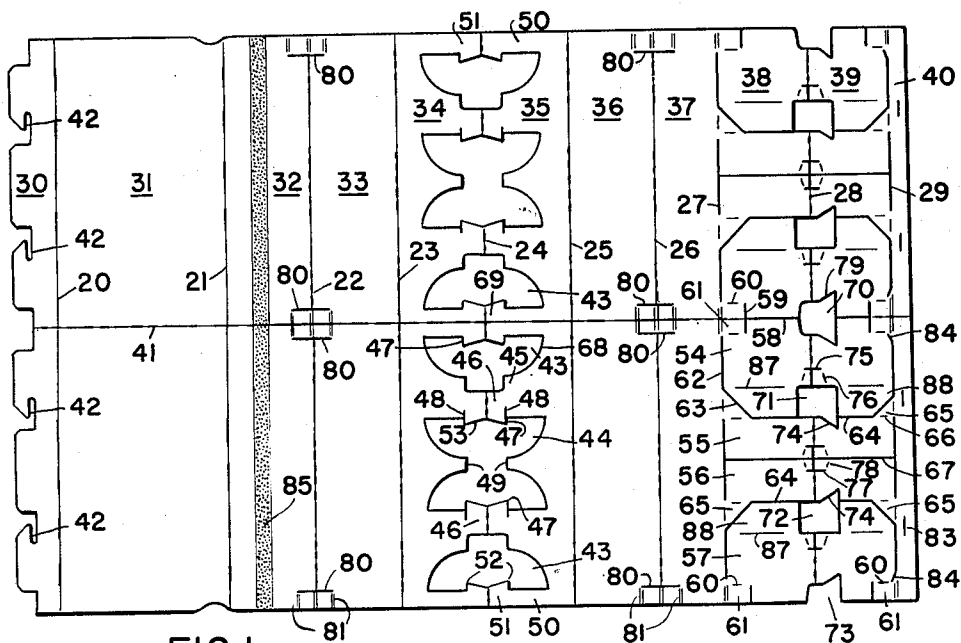


FIG. 1

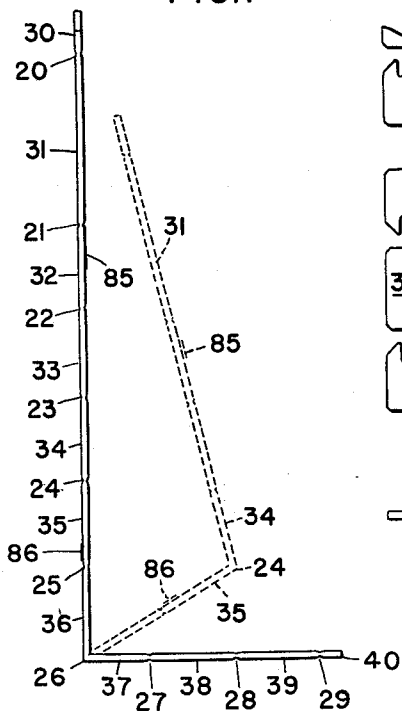


FIG. 2

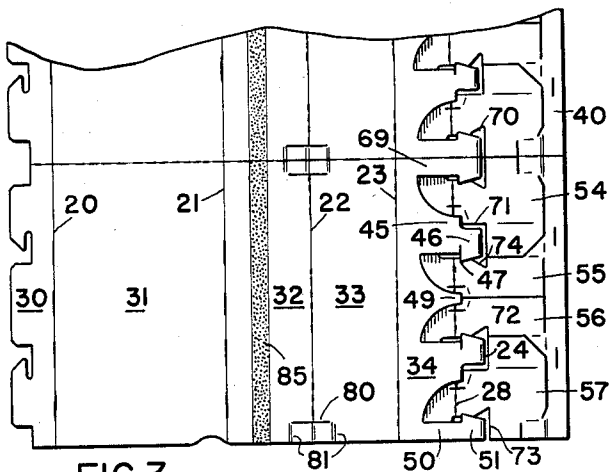


FIG. 3

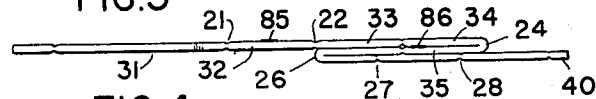


FIG. 4

INVENTORS
WILLIAM H. INMAN
RAYNOR M. HOLMES
BY
Cumpton & Shaw
their attorneys

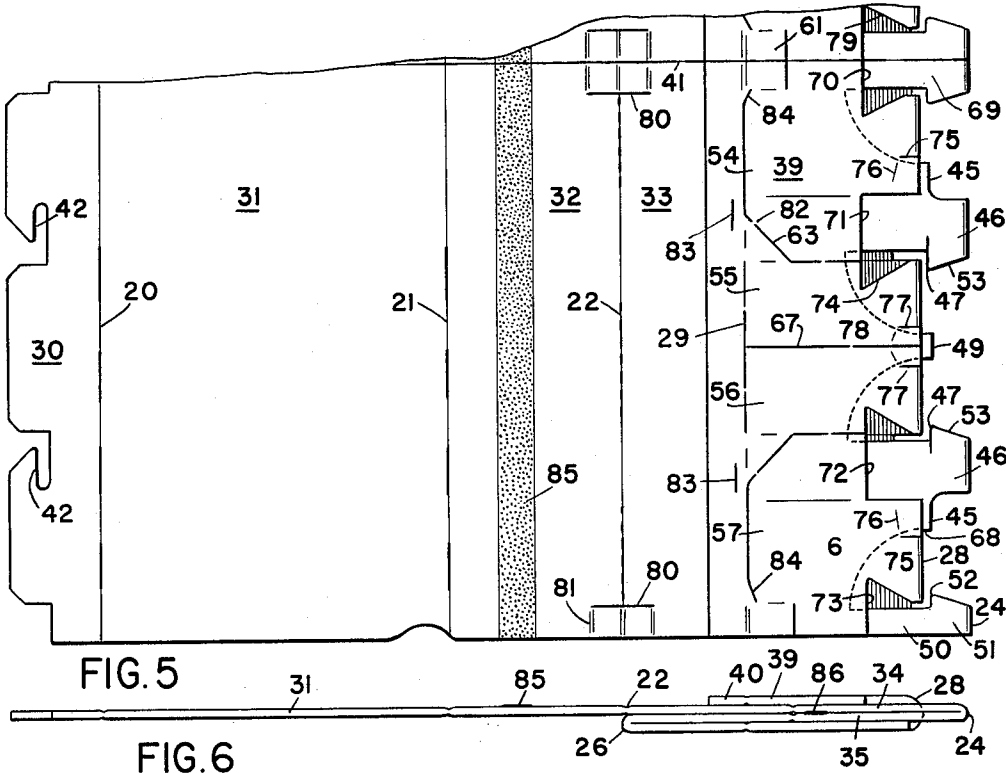
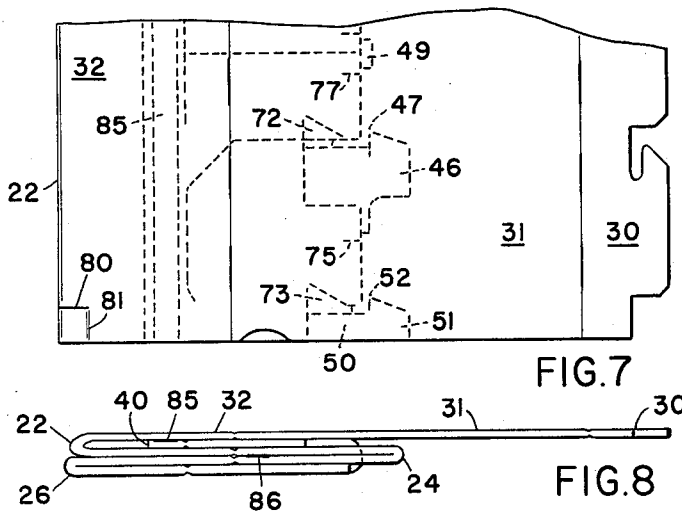
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WILLIAM H. INMAN
RAYNOR M. HOLMES
BY
Cumpton & Shaw
their attorneys

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4 Sheets-Sheet 3

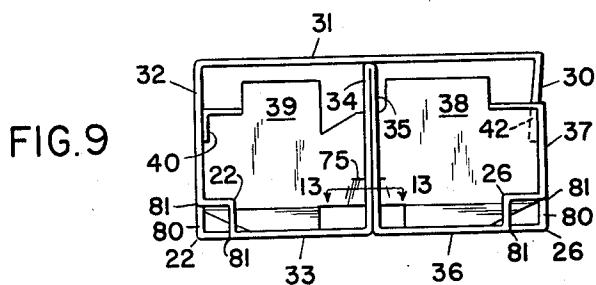
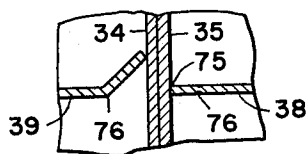


FIG. 13

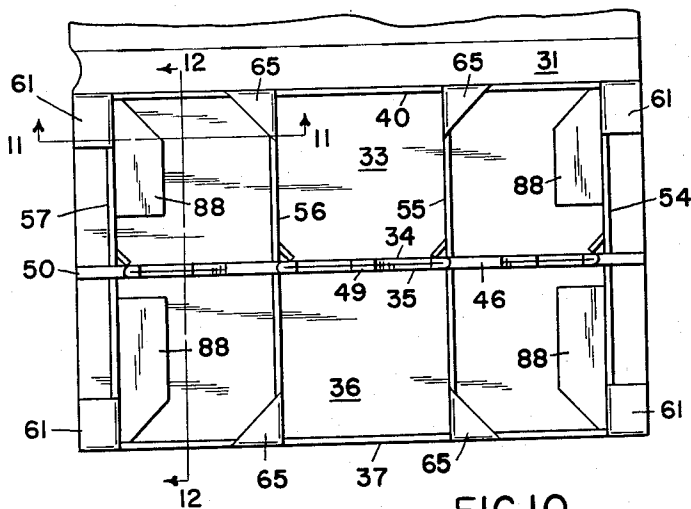
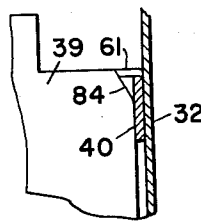


FIG. 14

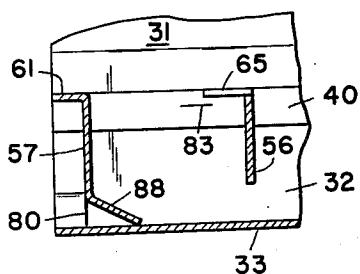


FIG. 11

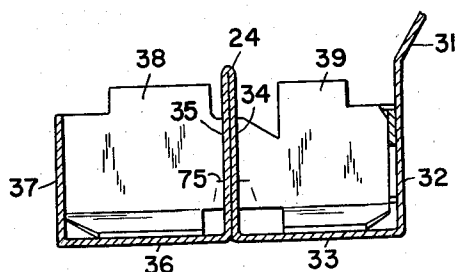


FIG. 12

INVENTORS
WILLIAM H. INMAN
RAYNOR M. HOLMES
BY
Cumprison & Shaw
their attorneys

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W. H. INMAN ET AL
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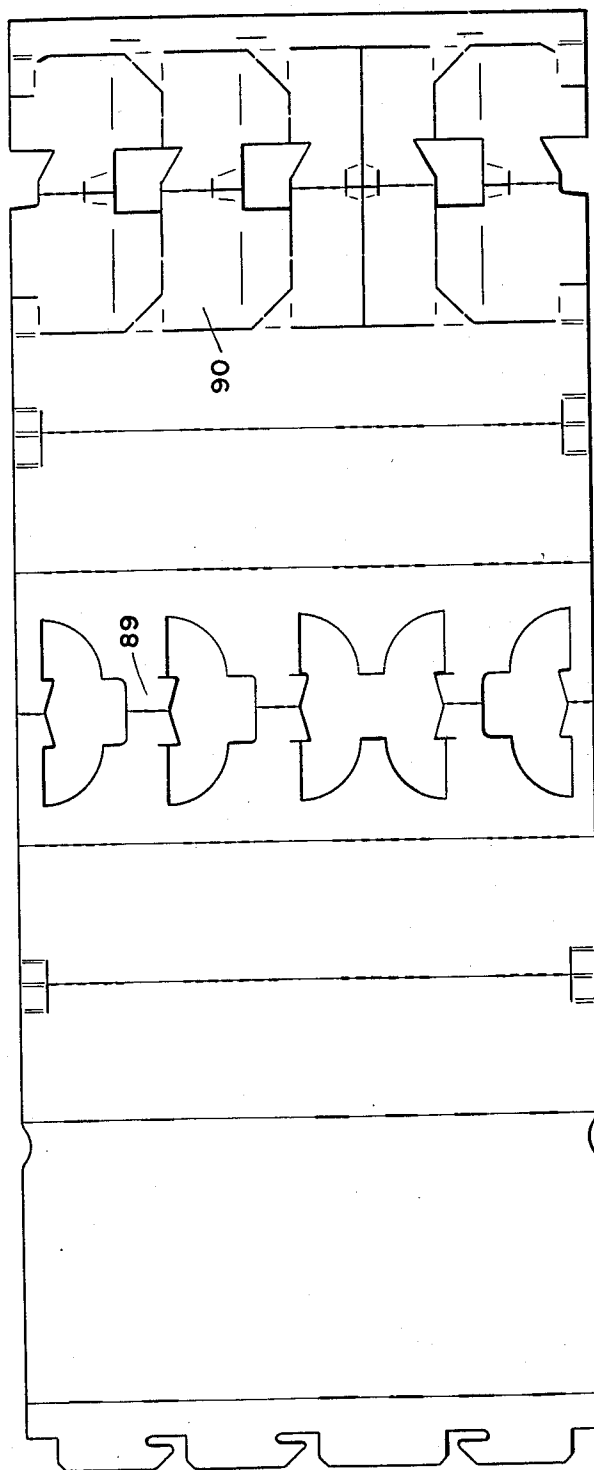


FIG. 15

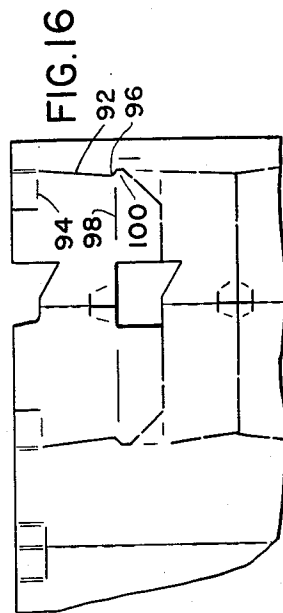


FIG. 16

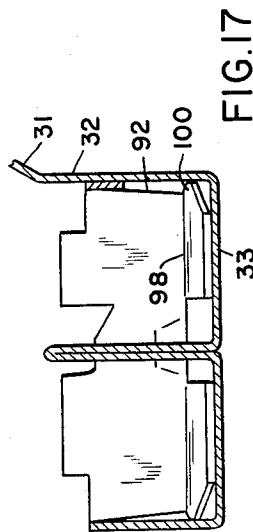


FIG. 17

INVENTORS
WILLIAM H. INMAN
RAYNOR M. HOLMES

BY

Cumpton & Shaw

their attorneys

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2,955,735

COLLAPSIBLE CELLULAR CARTON

William H. Inman and Raynor M. Holmes, Newark, N.Y., assignors to Bloomer Bros. Company, Newark, N.Y., a corporation of New York

Filed Nov. 8, 1957, Ser. No. 695,274

4 Claims. (Cl. 229—28)

This invention relates to cartons and more particularly to collapsible cellular cartons made of paperboard or other foldable sheet material, for containing fruit and vegetable products, bakery goods, or other fragile articles, one object of the invention being to provide a carton of this character having an improved construction better adapted for economical production by automatic machinery.

Another object is to provide such a carton having a construction capable of being more precisely and securely erected for filling and use.

Still another object is the provision of a carton having the above advantages in a construction requiring a minimum of material and capable of production economically at low cost.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a plan view of a blank for a carton embodying the present invention;

Fig. 2 is an edge view showing steps in the folding of the same;

Fig. 3 is a plan view partly broken away showing the blank partly folded;

Fig. 4 is an edge view corresponding to Fig. 3;

Fig. 5 is an enlarged plan view partly broken away showing further folding of the blank;

Fig. 6 is an edge view corresponding to Fig. 5;

Fig. 7 is an enlarged plan view showing the blank fully folded and collapsed;

Fig. 8 is a plan view similar to Fig. 7;

Fig. 9 is an end view of the erected carton;

Fig. 10 is a top plan view of one half of the carton with the cover open and partly broken away;

Fig. 11 is a fragmentary, sectional view on the line 11—11 in Fig. 10;

Fig. 12 is a sectional view on the line 12—12 in Fig. 10;

Fig. 13 is an enlarged, fragmentary, sectional view on the line 13—13 in Fig. 9;

Fig. 14 is an enlarged, fragmentary view of parts shown in Fig. 12;

Fig. 15 shows a blank for a modification having only four cells in each longitudinal row;

Fig. 16 is a plan view of a corner portion of a blank of slightly modified form, and

Fig. 17 is a transverse section similar to Fig. 12 but showing a carton made from the blank of Fig. 16.

The preferred embodiment of the invention, herein disclosed by way of illustration, comprises a blank of foldable paperboard material of known and suitable consistency and thickness which may have its surface waxed or otherwise treated to make it moisture resistant, as well understood in the art. The blank has the generally rectangular shape shown in Fig. 1 and is divided by longi-

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tudinally extending scored folding lines 20 to 29, inclusive to separate the longitudinally extending carton into a cover securing strip 30, a cover 31, a rear side wall 32, a rear bottom section 33, longitudinal partition walls 34 and 35, a front bottom section 36, a front side wall 37, transverse partition sections 38 and 39 and an attaching strip 40. The blank is divided by a line of weakening or tear line 41 of spaced scores or slits extending transversely of its walls and centrally between its ends so that the whole carton may be separated, when desired, into half cartons. Cover securing strip 30 is formed in each half carton with a pair of oppositely extending hooks 42 for engagement with lugs at the top of the front wall to secure the cover in closed position, as well understood in the art.

The longitudinal partition walls 34 and 35 shown unfolded in Fig. 1 and folded together in Fig. 3 are formed with notches or cut-outs 43 and 44 extending symmetrically into each wall, as shown and each half carton has similar notches 43 adjacent its ends and directed in opposite relation to each other as shown, on opposite sides of the central double notch 44. Each notch 43 forms with central notch 44 a projection 45 having an upward extension 46 at one side of its top. Extension 46 terminates in fold line 24 and is formed at one side with a hook shoulder 47 extending longitudinally into notch 44. The projections 45, having substantial width and rigidity, have slits 48 extending thereinto from the base of the hook shoulder 47 for a purpose hereafter described. Double notch 44 provides at its center a projection 49 terminating substantially in line with the base of the hook shoulders 47. The adjacent notches 43 on opposite sides of the tear line 41 form between them a double projection 69 containing the tear line 41 centrally therethrough and formed with hook shoulders extending in opposite directions. The notches 43 at the ends of the whole carton form projections 50 having extensions 51 provided with hook shoulders 52, as shown. Projections 50 at the carton ends are of less width and rigidity than projections 45 and may or may not be provided, like projection 45, with the slit 48 under the hook shoulder. The central double projections 69 are rendered more flexible by the tear line 41 and may or may not be provided with such slits 48, as found desirable. The hook extensions 47 and 52 have their sides above the hook shoulders inclined obliquely inward, as at 53, for a purpose hereafter described. These partition wall sections 34 and 35 are folded about score line 24 and brought together and secured in back to back relation in the folding of the carton, as hereafter described, so that their projections, extensions and hook shoulders are brought into coincidence, as shown in Fig. 3.

The transverse partition forming sections 38 and 39 in each half carton are slit to form transverse partitions 54 to 57, inclusive, partitions 54 and 57 extending in opposite directions on opposite sides of intermediate partitions 55 and 56 which likewise extend in opposite directions relative to each other. Each partition 54 is formed by a transverse slit 58 coinciding with tear line 41 and a short intersecting longitudinal slit 59. These, with short transversely extending scores or slits 60 on opposite sides of tear line 41, mark out at each end of the partition a rectangular lug 61 on which the partition is hinged and supported along the line indicated by the score 60 which insures sharp and precise linear bending. The remainder of the partition is outlined by end slits 62, oblique corner slits 63 and bottom slit 64. Partitions 54 and 57 each have slits 87 cut across them in line with the sides of notches 71 and 72 to free foot or bottom flanges 88 of substantial width for binding in frictional engagement with the bottom wall (Figs. 10 and 11) and

so as to partially underlie the contents of the adjacent cells and be held thereby.

The oblique corner slits 63 from one side of triangular lugs 65, the other sides of which are delineated by slits 66 cut through the material, in the fold lines 27 and 29 and cut in line with the slit 64, insuring sharp and precise bending at the hinge line. These lugs 65 form the means for hingedly supporting central partitions 55 and 56. Partition 57 is formed similarly to the partition 54 described above, being hingedly supported on rectangular lugs 61 at fold lines made by slits 60.

Partition 55 is separated by the slit 64 at the foot of partition 54, by slits in the fold lines 27 and 29 and by a slit 67 separating it from partition 56 which is similarly formed before folding in the opposite direction about the triangular lugs 65. The transverse partitions contain cutouts or notches 70 to 73, inclusive, to receive the extensions 46 and hook shoulders 47 of the longitudinal partition walls. Each notch is extended at its rear end in a point including an inclined edge 74 (Figs. 1 and 5) cut from the adjoining partition so as to clear the hook extensions 46 of the longitudinal partition walls except for the points of their hook shoulders 47, as hereafter described. Such points of notches 71 and 72 are cut from the tops of partitions 55 and 56, as shown. Notches 71 and 72 have connecting T slits 75 cut in the partitions 54 and 57 to receive and straddle the projections 45 along their arcuate sides 68 in continuous engagement therewith in both the collapsed and erected positions. Scores or slits 76 on opposite sides of T slits 75 form therewith a pair of tabs sliding in frictional engagement with the edge of corresponding projection 45 and the rearward slit 76 is at a greater distance from the T slit so that the longer tab is formed on that side of the T slit, for a purpose hereafter described.

Similar T slits 77 in partitions 55 and 56 (Figs. 1 and 5) connect with the slit 67 therebetween and are similarly provided on opposite sides with the slits or scores 78 forming tabs for frictional engagement with the arcuate sides of projections 49 of the longitudinal partition walls in both collapsed and erected positions. Notch 70 on the tear line 41 has oppositely pointed extensions at its rearmost end formed by oblique lines 79 corresponding to the oblique lines 74 of notches 71 and 72 and for a similar purpose.

The partitions at the opposite ends of the carton, as 57, and those adjoining the tear line 41, are provided with abutments for supporting such partitions in erected, cell-closing position, such abutments being formed by slits 80 (Figs. 1 and 9) extending transversely of fold lines 22 and 26 at the bottoms of the front and rear carton walls. These slits are spaced inwardly from the ends of the half cartons and are connected to the carton ends and to tear line 41 by spaced scored fold lines 81, as shown, providing portions adapted to be folded inwardly about such lines 81 and fold lines 22 and 26, as shown in Fig. 9, to provide angular abutments preventing the transverse partitions from swinging beyond their vertical position.

The transverse partitions 54 and 57 are cut to leave small ligament or tie portions 82 (Fig. 5) adjacent fastening strip 40 to hold them in position during the formation of the carton, subject to being readily ruptured when the carton is erected and the partitions swung to vertical cell-forming position. Such tying portions tend to strip surface ribbons from the adjacent fastening strip 49 and such tearing is preferably limited by slits 83 cut through the fastening strip.

Partitions 54 and 57 preferably have the slits at their ends in fold line 29 (Figs. 1, 12 and 14) extended inwardly as at 84 adjacent their hinge lugs 61 to permit them to be swung downwardly more freely and without puckering in the corner at the hinge lug.

The blank is provided with glue lines 85 and 86 (Figs. 1 and 2) by glue rolls or other suitable means well known

in the art, the glue line 85 securing the fastening strip 40 to the rear wall of the carton, and the glue line 86 securing together the longitudinal partition walls 34 and 35.

The carton is preferably folded as indicated in Figs. 2, 3 and 4, first about fold line 26 and then about fold line 24 to bring the projections 45, extensions 46 and hook shoulders 47 down over the notches 70 to 73, inclusive, in the transverse partitions, as shown in Fig. 3. The rear halves of the transverse partitions and the fastening strip 40 are then folded about fold line 28 so as to overlie the projections 45 and their hook shoulders 47 and 52. In such folding the extensions 46 pass through notches 70 to 73, inclusive, oblique edges 53 of the hook shoulders engaging slightly with the oblique edges 74 and 79 of the notches (Fig. 1). The inclined edges slide along one another until the hook shoulders bend slightly and snap through the notches. The top shoulders of projections 45 pass into the T slits 75, while the projections 49 pass through the T slits 77, the parts then occupying the position shown in Figs. 5 and 6 with the longitudinal partition walls 34 and 35 secured together by the glue strip 86. It will be noted in this position that the top shoulders of projections 45 and 49 fall beyond the fold line 28 and the T slits in the bottoms of the transverse partitions and against the longer rearward tab formed by the T slits and the short fold lines 76 and 78, the longer tab yielding as shown in Fig. 13. The projections of the longitudinal partition walls are thus engaged with the transverse partitions in both collapsed and erected positions, so that no threading of one through the other is required in the use of the carton. The cover 31 and rear wall 32 are then folded about fold line 22 to the position shown in Figs. 7 and 8, the fastening strip 40 being secured to the rear wall by the glue line 85, and the completed carton then occupying the flatly collapsed position shown in Fig. 8 in which it may be conveniently shipped and stored ready for erection and use.

Instead of the carton having six cells in each longitudinal row as described above, the same principles of construction may be embodied in a shorter carton having only four cells in each longitudinal row. The blank for such a modification is shown in Fig. 15 as having the same arrangement of parts as in each half carton described above except that one of the intermediate hook projections is repeated as at 89, for an additional transverse partition 90, as shown.

Fig. 16 shows a blank of the same construction as shown in Fig. 1 except that the transverse partitions 54 and 57 of Fig. 1 of each half carton here have their ends formed by slits 92 extending in a straight line from their hinge lines 94 but inclined inwardly at a slight angle to a point 96 adjacent the slits 98 of their bottom flanges, but with a terminal projection 100 for engagement with the carton side walls. Such inclination of the ends of the partitions facilitates the downward turning of the same in the machine erection of the carton. Fig. 17 shows an erected carton made from the modified blank of Fig. 16.

It is apparent from the foregoing description that the invention provides a carton blank which may be readily cut, scored, glued and folded to form the finished carton in collapsed condition, by known and automatic machines, in a rapid manner. The upstanding hook projections of the longitudinal partition walls are already threaded through the slits in the bottoms of the transfer partitions in the collapsed condition so that they do not require threading through the partitions while being erected and when erected they engage and support the carton cover (Fig. 9). The bottoms of the transfer partitions at the ends of the half cartons, as well as the supporting lugs for all of the partitions, are effectively slitted so as to bend sharply and precisely without puckering in the erection of the partitions, thus facilitating the erection of the same in use, while the bottom flanges of the end partitions are of substantial width so as to partially underlie the contents of the adjacent cells and

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thus contribute to the anchoring of the partitions in vertical position. Such retention of these partitions in vertical position is insured by the infolded corner abutments which serve as positive stops for holding the partitions in erected position. The 2 x 6 cell carton may be conveniently separated along the tear line into half cartons of 2 x 3 cells each, the tear line extending through the central upward projection of the transverse partition walls so as to separate the projection into two parts each otherwise intact for supporting the end cells adjacent the line of separation. The blank and carton are so designed as to require a minimum of material and to be effectively adapted for manufacture at a rapid rate for quantity production at minimum cost.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of preferred embodiments, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

We claim:

1. A collapsible cellular carton made from a blank of foldable sheet material cut, scored and folded to form a pair of longitudinally extending, spaced side walls, a bottom wall formed of two sections each having its outer edge foldably connected with the bottom edge of the adjacent side wall, a cover hingedly connected to one of said side walls, a longitudinal partition comprising two wall sections each foldably connected along one longitudinal edge with the inner side edge of the adjacent bottom section, said longitudinal partition walls having their inner side edges foldably connected along a longitudinal fold line in back to back relation with notches cut therein downwardly from said fold line to form a plurality of spaced upstanding projections, certain of said projections having upward extensions formed to provide longitudinally extending hook shoulders, said notches having straight sides adjoining said projections and arcuate opposite sides, a plurality of transverse partitions hingedly connected at opposite ends thereof to said side walls and having notches cut therein to receive said extensions in the folding of the carton, said partitions being foldable into the notches of said longitudinal partition walls in erected straddling relation with said projections, said partitions having their free edges formed with T slits providing bendable tabs in continuous frictional engagement with the arcuate edges of said notches in collapsed and erected positions, said tabs of each T slit having different widths with the wider tab toward the side wall to which said cover is connected and said extensions having slits cut inwardly thereof at said hook shoulders to enable said hooks to bend in yielding engagement with the sides of said partition notches, to facilitate the folding of said carton.

2. A collapsible cellular carton made from a blank of foldable sheet material cut, scored and folded to form a pair of longitudinally extending, spaced side walls, a bottom wall formed of two sections each having its outer side edge foldably connected with the bottom edge of the adjacent side wall, a cover hingedly connected to one of said side walls, a longitudinal partition comprising two wall sections each foldably connected along one longitudinal edge with the inner side edge of the adjacent bottom section, said longitudinal partition walls having their inner side edges foldably connected along a longitudinal fold line in back to back relation with notches cut therein downwardly from said fold line to form a plurality of spaced upstanding projections, certain of said projections having upward extensions formed to provide longitudinally extending hook shoulders for engagement with transverse partitions, said notches having straight sides adjoining said projections and arcuate op-

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posite sides, a plurality of transverse partitions hingedly connected at opposite ends thereof to supporting lugs hingedly connected to said side walls, said lugs having slits cut in the hinge lines thereof to facilitate folding at said lines, said partitions having notches cut therein to receive said extensions in the folding of the carton, said partition notches and said extensions of said longitudinal partition walls having oppositely inclined edges cooperating to bend said extensions into engagement in said notches in the folding of said blank for continuing engagement in collapsed and erected positions, said partitions being foldable into the notches of said longitudinal partition walls in erected straddling relation with said projections, said partitions having their free edges formed with T slits providing bendable tabs in continuous frictional engagement with the arcuate edges of said notches in collapsed and erected positions, and certain of said partitions having slits cut therein to extend thereacross in line with the sides of the notches of said partitions to form bendable bottom flanges adapted to lie in frictional engagement with said bottom wall and to extend under the contents of the adjacent cells.

3. A collapsible cellular carton made from a blank of foldable sheet material cut, scored and folded to form a pair of longitudinally extending, spaced side walls, a bottom wall formed of two sections each having its outer side edge foldably connected with the bottom edge of the adjacent side wall, a cover connected to one of said side walls, a longitudinal partition comprising two wall sections each foldably connected along one longitudinal edge with the inner side edge of the adjacent bottom section, said longitudinal partition walls having their inner side edges foldably connected at their tops along a longitudinal fold line in back to back relation with notches cut therein downwardly from said fold line to form a plurality of spaced, upstanding extensions formed to provide longitudinally extending hook shoulders for engagement with transverse partitions, said notches having arcuate sides, a plurality of transverse partitions hingedly connected at opposite ends thereof to said side walls and having notches cut therein to receive said extensions in the folding of the carton, said partition notches and said extensions of said longitudinal partition walls having oppositely inclined edges cooperating to bend said extensions into engagement in said notches in the folding of said blank for continuing engagement in collapsed and erected positions, said partitions being foldable into the notches of said longitudinal partition walls and in erected straddling relation with said extensions, said partitions having slits in their free edges providing bendable tabs in continuous frictional engagement with said arcuate sides of the notches of the longitudinal partition walls in collapsed and erected positions, and said side walls and bottom wall having slits cut therein transversely of the line of fold therebetween adjacent the ends of the carton with scored fold lines extending longitudinally from the ends of said slits to the ends of the carton, to form inwardly foldable portions providing abutments for supporting the end partitions in erected, cell closing position.

4. A collapsible cellular carton made from a blank of foldable sheet material cut, scored and folded to form a pair of longitudinally extending, spaced side walls, a bottom wall formed of two sections each having its outer side edge foldably connected with the bottom edge of the adjacent side wall, a cover hingedly connected to one of said side walls, a longitudinal partition comprising two wall sections each foldably connected along one longitudinal edge with the inner side edge of the adjacent bottom section, said longitudinal partition walls having their inner side edges foldably connected along a longitudinal fold line in back to back relation with notches cut therein downwardly from said fold line to form a plurality of spaced upstanding projections, certain of said projections having upward extensions formed to

provide longitudinally extending hook shoulders, a plurality of transverse partitions hingedly connected at opposite ends thereof to said side walls and having notches cut therein to receive said extensions in the folding of the carton, said partition notches and said extensions of said longitudinal partition walls having oppositely inclined edges cooperating to bend said extensions into engagement in said notches in the folding of said blank for continuing engagement in collapsed and erected positions, said partitions being foldable into the notches of said longitudinal partition walls and in erected straddling relation with said projections, said partitions having their free edges formed with slits in continuous frictional engagement with the edges of said notches of the longitudinal walls in collapsed and erected positions, a central one of said projections being formed with hook shoulders extending in opposite directions, the partitions at the ends of said carton and at said central projection being bendable in opposite directions, respectively, a line of weakening at the center of said carton extending trans-

versely therearound and centrally through said central projection so that said carton may be separated at said line of weakening into two smaller cartons, and slits cut transversely of the line of fold between the side and bottom walls at the ends of said carton and on opposite sides of said line of weakening to provide portions adapted to be folded inwardly to form abutments for supporting the end partitions for the separated carton portions.

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