

[54] DISPOSABLE TRAY

[76] Inventors: **David Schneider**, 10 Peachtree Rd., Lexington, Mass. 02173; **George Shumrak**, 17 Fox Hill Dr., Natick, Mass. 01760

[22] Filed: **Oct. 29, 1971**

[21] Appl. No.: 193,620

[52] U.S. Cl. 229/2.5, 229/DIG. 4, 229/DIG. 2

[51] Int. Cl. B65d 1/34, B65d 1/44

[58] Field of Search 229/2.5, 3.1, DIG. 2, DIG. 4

[56] **References Cited**

UNITED STATES PATENTS

3,401,863	9/1968	Earl	229/2.5
1,748,865	2/1930	Chaplin.....	229/2.5
2,832,522	4/1958	Schlanger	229/2.5

2,317,773	4/1943	Kavanaugh	229/DIG. 2
2,324,757	7/1943	Botley.....	229/DIG. 2
2,997,927	8/1961	Carson.....	229/2.5 X
3,122,300	2/1964	La Bombard	229/DIG. 4
3,659,772	5/1972	Dorsey.....	229/DIG. 4

Primary Examiner—Davis T. Moorhead

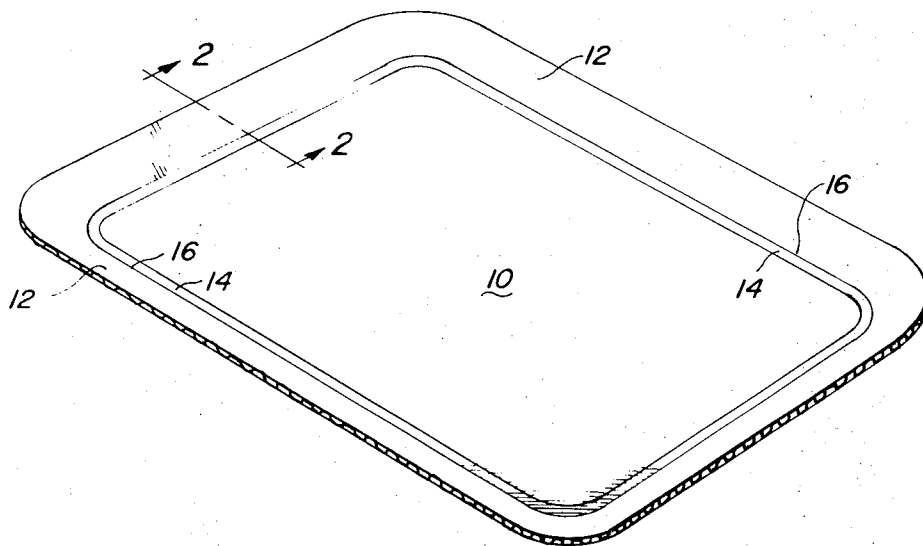
Attorney, Agent, or Firm—Wolf, Greenfield & Sacks

[57]

ABSTRACT

A light weight serving tray of inexpensive construction is suited particularly for disposable use. The tray is fabricated from a single sheet of material such as corrugated cardboard. Selected regions of the tray are scored and compressably deformed in a manner which insures that the peripheral margin of the tray will assume and maintain its upstanding, rail-like configuration.

5 Claims, 9 Drawing Figures



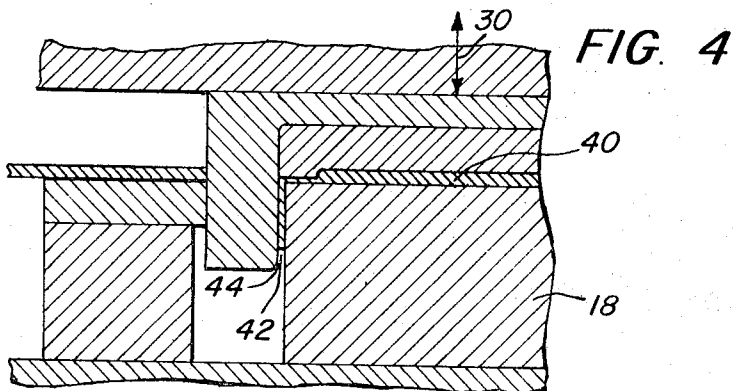
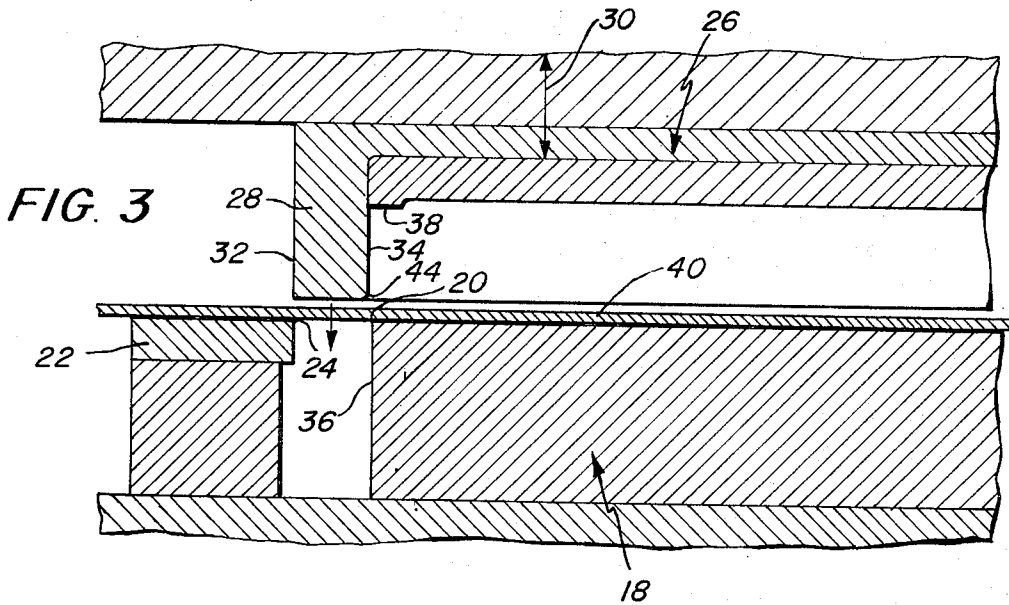
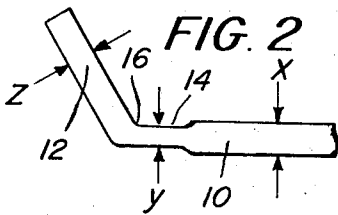
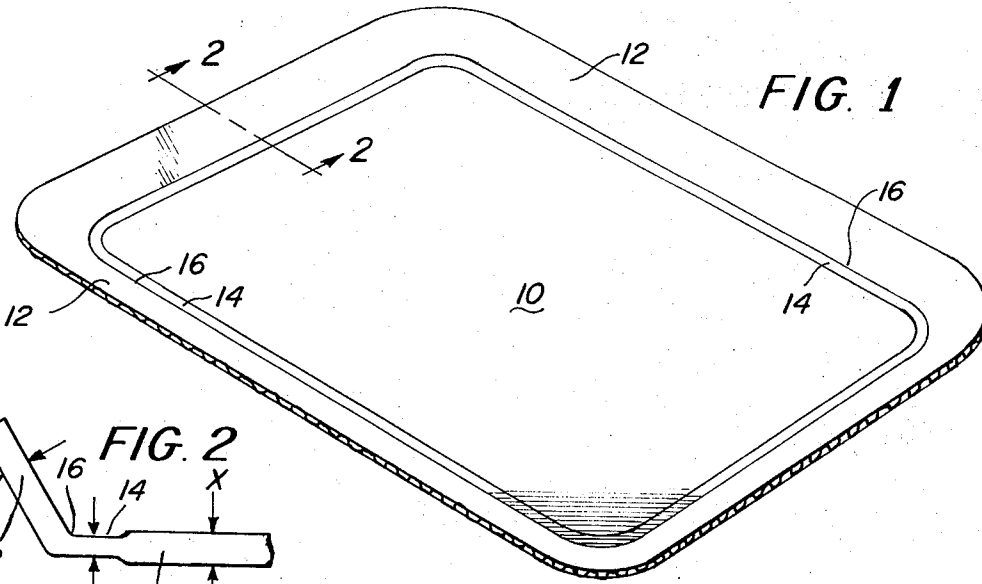


FIG. 5

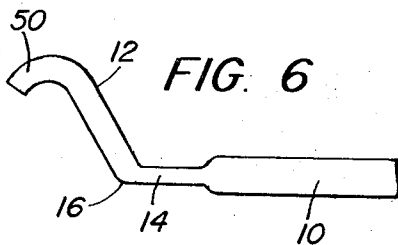
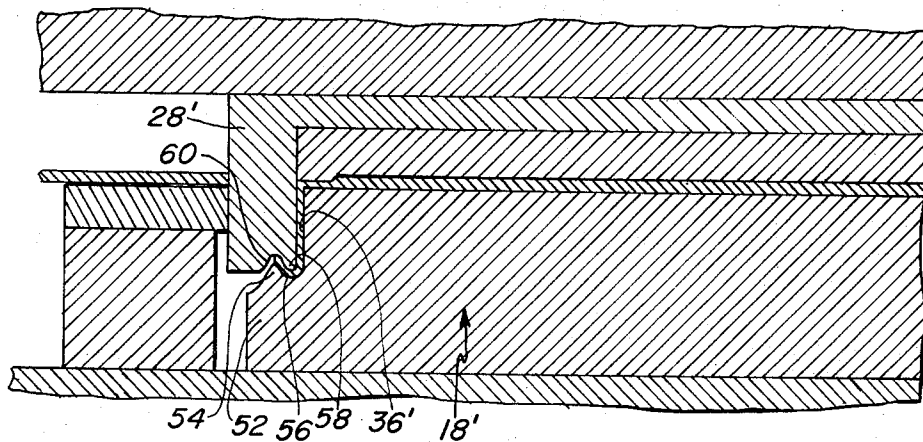


FIG. 7

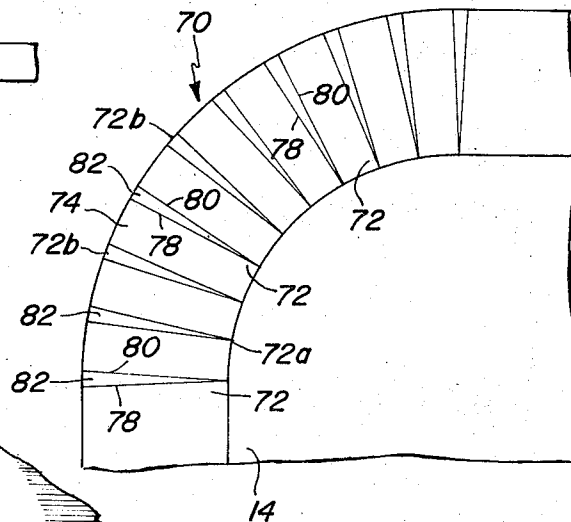


FIG. 8

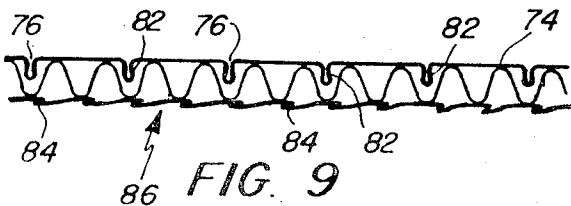
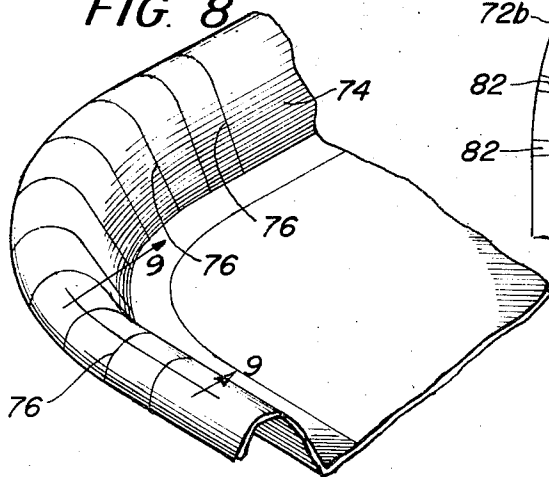


FIG. 9

DISPOSABLE TRAY

BACKGROUND OF THE INVENTION

This invention relates to serving trays of the type used widely in hospitals and other institutions, and in cafeterias, commercial airplanes and other places where a large number of people are to be fed in a relatively short time. It has been common practice, for a long time, to serve the food on trays of rigid, permanent construction such as plastic, metal or other similar durable material adapted for repetitive use over an extended period of time. Although these serving trays have, for the most part, proved satisfactory, their use has not been entirely free of difficulties. For example, because these trays are used repeatedly, storage and handling facilities must be provided. Additionally, in order to maintain the trays in a sanitary, hygienic condition, they must be washed thoroughly after each use. In some instances, this requires special washing machines suited particularly for this purpose. When using conventional serving trays, it sometimes may be desirable to place doilies or other coverings on the trays to present a more pleasing appearance to the person being served. Furthermore, these permanent serving trays require a somewhat cumbersome manufacturing technique in that they must be molded or stamped and then finished finally to remove all flash or sharp edges. In contrast, the serving trays of this invention may be fabricated by an extremely simple technique which is suited particularly for high volume production. Unlike other previously proposed disposable trays which have raw exposed edges and non-uniform appearance, the instant invention has a neatly rolled rim and evenly rounded corners.

SUMMARY OF THE INVENTION

The tray is formed from flat sheet stock of inexpensive, light weight material such as corrugated cardboard. Although corrugated cardboard is suited particularly for the tray other materials may be employed such as those having light weight cellular structures, such as foam plastics and the like. As used herein, the term "cellular construction" is intended to mean any such material having a multi-cell configuration and displaying the requisite deformable characteristics.

The tray includes the usual flat surface and an upwardly bent outer margin which defines a rim fully about the tray.

One of the primary features of the invention is the manner in which the rim is maintained in its upwardly extending configuration after the tray has been cut and formed and has been removed from the forming apparatus. For this purpose, the forming apparatus includes an arrangement for compressing a narrow region of the flat part of the tray which extends continuously along and adjacent the juncture of the flat part with the rim. This narrow band is compressed to an extent so that it is deformed permanently. The permanently deformed band reduces substantially the degree to which the rim tends to snap back to or assume its original flat position with respect to the main flat portion of the tray. The margin of the tray thus is set firmly in its upwardly bent configuration. In the preferred form, the corners of the tray rim are prescored on one face in a radial direction, which causes neat pleats to form at the corners when

the rim is bent upwardly out of the central plane of the tray.

Each tray may be coated on its upper surface with a water-resistant coating and/or a friction material to retard dishes from slipping about on the tray. Additionally, the tray may be provided with printed matter on either of its surfaces for decoration, to provide games, advertising, or other reading material.

It is among the primary objects of the invention to provide a low cost single service food tray.

A further object of the invention is to provide a food serving tray which does not require any associated storing, washing or other cumbersome facilities for handling the trays.

Still another object of the invention is to provide a food serving tray which facilitates the serving of food in a sanitary hygienic manner.

Another object of the invention is to provide a tray which may be formed in a single cutting and forming step from a flat sheet of material and in which the peripheral margin of the tray is self-supporting in its rail-defining attitude.

Still another object of the invention is to provide an improved and simplified method for fabricating serving trays of the type described.

Yet another object of the invention is to provide a single service tray having a neat, tailored appearance comparable to that of a reusable tray.

DESCRIPTION OF THE DRAWINGS

The foregoing and other objects of the invention will be understood more fully from the following detailed description thereof, with reference to the accompanying drawings wherein:

FIG. 1 is an illustration of a finished tray made in accordance with the invention;

FIG. 2 is an enlarged sectional view of the tray taken along section line 2—2 of FIG. 1 showing the juncture of the flat portion and the rail-like peripheral margin with cross hatching removed;

FIG. 3 is an elevation, in section of the apparatus employed to fabricate the tray with the flat blank sheet inserted ready for fabrication;

FIG. 4 is an illustration of the tray forming apparatus after the blank sheet has been cut and formed;

FIG. 5 is an illustration similar to FIG. 4 but showing a modified die and punch arrangement to form a rolled edge on the rim about the tray;

FIG. 6 is similar to FIG. 2 but shows the rim formed with the apparatus of FIG. 5;

FIG. 7 is a fragmentary plan view of a tray blank scored but yet unformed for another embodiment of this invention;

FIG. 8 is a perspective view of one corner of a tray formed from the blank of FIG. 7; and

FIG. 9 is a cross sectional view of the tray corner taken along section line 9—9 of FIG. 8.

DETAILED DESCRIPTION

FIG. 1 shows the finished tray formed from a single flat sheet of corrugated cardboard having a flat main surface 10 and an upturned peripheral margin 12 which defines a rail-like member. The tray, formed in accordance with the invention, includes a narrow region 14 which surrounds the main surface 10 and is disposed just inwardly of the juncture 16 of the margin 12 with the main surface 10. The narrow region 14 is com-

pressed during formation of the tray to an extent sufficient so that after the compression forces are removed, the region 14 will expand only slightly towards its original thickness and will remain permanently deformed to a substantially reduced thickness from that of the original sheet. The margin 12 also is deformably compressed during formation of the tray but to a lesser degree than region 14 so that its final thickness will be intermediate that of region 14 and the main surface 10 of the tray. I have found that by compressing of the region 14 greater than margin 12, the margin of the tray tends to support itself at an increased angle to the main surface 10 than had been previously obtainable by merely bending over the marginal portion of the original blank.

FIG. 2 suggests some approximate relative dimensions of a tray formed in accordance with the invention. In this embodiment, the tray may be formed from flat corrugated cardboard sheet stock of A, B, C or E flute configuration and having a burst strength of approximately 200 lbs. per square inch Mullen test and having an original thickness of between 0.145 and 0.165 inches. After formation, the main surface 10 is substantially uncompressed and is of the same thickness "X" as the original stock. The narrow region 14 may be compressed to an extent so that after removal from the forming apparatus, its thickness "Y" is between 0.105 and 0.110 inches. A representative relative thickness "Z" of the rim 12 might be between 0.130 and 0.145 inches. In the illustrative embodiment where the material is corrugated cardboard greater strength is derived if the corrugations extend lengthwise of the tray.

FIGS. 3 and 4 show the apparatus employed to fabricate the trays in a one step operation. The apparatus includes a form punch 18 having a relatively sharp upper peripheral edge 20. The form punch 18 is surrounded by a trimming die 22 having a sharp upper cutting edge 24. The cutting edge 24 of the die 22 is spaced from the periphery of the form punch 18 around the entire punch 18, by an amount corresponding to the intended width of the tray margin 12. The cutting edge 24 of the die 22 preferably is coplanar with the upper surface of the form punch 18 and particularly its edge 20.

The apparatus of FIGS. 3 and 4 also includes a combined trimming and forming member 26 which has a peripheral, downwardly extending wall 28 adapted to fit between the spaced trimming die 22 and punch 18. The trimming and forming member 26 is mounted for driven movement with respect to punch 18 and trimming die 22 along the path suggested by arrow 30. The outer surface of wall 28 forms a trimming face 32 which cooperates with cutting edge 24 of trimming die 22 to cut a tray from the sheet of flat corrugated blank. The inner surface of wall 28 defines a forming die 34 and is dimensioned to provide only slight clearance between it and the outer wall surface 36 of punch 18. In the example described above this clearance may be approximately 0.030 inch. The inner portion of the trimming and forming member 26 also includes a downwardly extending shoulder 38 which extends fully about the inner periphery of the wall 28.

When forming a tray using the above described apparatus, trimming and forming member 26 is initially spaced from form punch 18 and trimming die 22 to permit the blank sheet stock 40 to be inserted between the two, as shown in FIG. 3. After sheet 40 has been posi-

tioned in the device, member 26 is driven downwardly to simultaneously trim the outline of the tray and sever it from the sheet 40 between trim face 32 and trimming die 22. As member 26 continues its downward advancement, the margin 12 of the severed blank is folded downwardly in the narrow space 42 between die 34 and the outer wall surface 36 of punch 18. This action causes the margin to be formed into the tray rim and also compresses margin 12 so that after removal of the finished tray from the apparatus the marginal portion will be of lesser thickness than that of the original stock. The lower edge of forming die 34 may be somewhat rounded, as shown at 44 to facilitate smooth engagement of the forming die with the downwardly extending margin 12. The downward movement of the member 26 is continued to cause shoulder 38 to bear firmly against and thereby form narrow region 14 of the tray. The shoulder 38 is dimensioned with respect to the path of travel of the member 26 and the upper surface of form punch 18 so that region 14 will be subjected to a substantial compressive force as described above.

After the trimming and forming downward stroke of the member 26 has been completed, it is raised to enable the finished tray to be withdrawn. Although the margin or rim 12 tends to expand back to its original flat configuration, this tendency is reduced substantially by the added deformation of the narrow band 14. Thus, after the formed tray has been removed, the angled configuration of the rim 12 with respect to the main surface 10 of the tray has a relatively permanent set. One of the features of the foregoing technique is that because of the compressive deformation of the narrow region 14, rim 12 tends to become set at a steeper angle than if the rim 12 had been simply bent without the incident compression. For example, I have found that by providing the compressively deformed region in the tray, the angle between the rim 12 and main surface 10 may be increased between 8° to 10° from the angle achieved without compressing the region 14. In the preferred form, the margin is set at an angle of approximately 70°.

FIG. 5 shows one modified arrangement for the punch and die which is intended to produce a tray having a rolled edge of the type shown in FIG. 6. This tray is substantially the same as that heretofore described except that the rim edge 50 is rolled. This is particularly desirable when the tray is formed from corrugated cardboard in order to present a smooth upper edge for the rim by hiding the severed edge of the corrugated cardboard. As shown in FIG. 5, the die-punch arrangement employed to produce the rolled rim is similar to that shown in FIG. 3 except that the form punch 18' has a shoulder 52 extending about its periphery. The upper end of shoulder 52 includes an upwardly extending rib 54 which defines a channel 56 in cooperation with the sidewall 36' of punch 18'. Channel 56 and rib 54 cooperate with generally complementary surfaces on the underside of the wall 28'; these surfaces include a downwardly projecting finger 58 and a groove 60. The various parts are dimensioned in relation to each other and to the stroke of the die-punch arrangement so that when the punch and die are in the closed position, the extreme edge of the rim will be constrained in the reversely bent configuration shown in FIG. 5. When the die and punch are separated to remove the tray, the

edge of the rim is deformed to define the rolled configuration shown in FIG. 6.

In FIGS. 7, 8 and 9 a preferred embodiment of tray is shown, which has a somewhat more tailored and orderly appearance than the trays of FIGS. 2 and 6. The improved configuration is derived from the controlled pleating of the upper layer of the corrugated cardboard as opposed to a random pleating which results when no special provisions are made to control the pleat formation.

In FIG. 7 a plan view of the blank is suggested. About the corner 70 a plurality of generally radial V-shaped score lines 72 are formed in the upper surface 74 of the corrugated board. The score lines extend from the region of the narrow band area 14 to the very periphery of the blank when cut, and each of the score lines generally is in the shape of a V with the apex 72a at the region 14 and the wider end 72b at the periphery. The scored region at each corner extends about approximately 90° so as substantially to cover the area which is reduced in size when the margin 12 of the tray is bent to the inclined position as suggested in FIGS. 2 and 6.

When the blank is prescored in the manner suggested in FIG. 7 and subsequently formed by the techniques of FIGS. 3 and 4 or FIG. 5, a controlled upset of the corrugated occurs rather than pleated folds in a random pattern at the corners. This is best illustrated in FIGS. 8 and 9. In those figures it will be noted that the folds or pleats which are formed extend into the cellular interior of the corrugated, and the upper surface is left with lines 76 defined by the sides 78 and 80 of the V-shaped score lines, which are brought together. That is, the portion 82 of the corrugated which lie between the side margins of the V-shaped score lines are bent into the cellular center of the board (the scalloped center ply), and the marginal lines substantially touch one another.

The absence of scored lines on the under side of the corrugated causes a somewhat random pattern to be formed by the pleats 84 on the bottom surface 86 of the tray at the corners, similar to that which is formed on the upper surface in the embodiments of FIGS. 2 and 6. However, because the bottom of the tray is not ordinarily exposed and does not command the attention of the upper surface, the uniformity or lack of uniformity of the pleating on the bottom surface is relatively unimportant.

In accordance with the preferred method of forming the tray of FIGS. 7-9, the flat sheet stock is prescored at the corners before the blank is cut or the tray formed. Thus, a secondary step is added to the tray fabricating process which takes place before the steps suggested in FIGS. 3 and 4 or FIG. 5. It will be appreciated that the prescoring of the sheet stock may be employed to advantage whether or not the rim is rolled in the fashion of FIG. 6, although the tray has a more finished appearance with the rolled rim of FIG. 6.

Some advantage in the fabricating technique may also be derived by setting up the corners and margin of the tray when the stock is heated by a heated die or premoistened. The pre-moistening of the stock as well as the preheating may assist in causing the margin to retain the angular configuration to a more exacting degree.

Thus, I have described an improved disposable serving tray and a technique for its production which enables the tray to be formed economically without fitting tabs together, cementing corners, etc. Moreover, the foregoing advantages are obtained while providing the tray with a rim which stands upward from the main surface at a substantial and functionally effective angle.

In the foregoing description and in the following claims, terms such as "upward" and "downward" are employed merely for ease of explanation. It should be noted that while the punch and die configuration has been described with the trimming and forming member 26 being disposed above the punch 18, these parts could be reversed.

It should be understood, however that the foregoing description of the invention is intended merely to be illustrative thereof, and that other embodiments and modifications may be apparent to those skilled in the art without departing from its spirit.

What is claimed is:

1. A disposable tray formed from a continuous, integral sheet of corrugated cardboard with top and bottom layers and an intermediate scalloped layer,

said tray comprising,
a flat base portion defined by the interior regions of said sheet,

the peripheral margin of said tray being bent upwardly at a juncture with said flat base portion to define an upturned rim fully about said tray said rim having a peripheral curved portion,

a narrow region of said flat base portion of said tray extending along and adjacent the juncture of said flat base portion and said rim being compressably deformed to a thickness which is less than that of said flat base portion, said compressed narrow region enabling said rim to remain permanently at a substantial angle to said flat portion,

and pleats in the top layer of said sheet at said curved portion.

2. A tray as defined in claim 1 further comprising: said rim being formed at its outer region to define a rolled edge.

3. A tray as defined in claim 1 further characterized by

said rim having a plurality of peripheral curved portions forming corners of said tray,

score lines in the top layer of the sheet at the peripheral margin and extending generally radially out from said juncture in the areas of the rim which are curved,

and orderly pleats being formed in the top surface at said areas and extending into the scalloped layer.

4. A tray as defined in claim 3 further characterized by each of the score lines being generally V-shaped with the apex of the V lying at the juncture and the open end of the V lying at the edge of the rim.

5. A disposable tray as defined in claim 1 further characterized by,

said rim being compressably deformed to a thickness which is less than the thickness of said flat base portion but is greater than the thickness of said narrow region.

* * * * *