

May 25, 1965

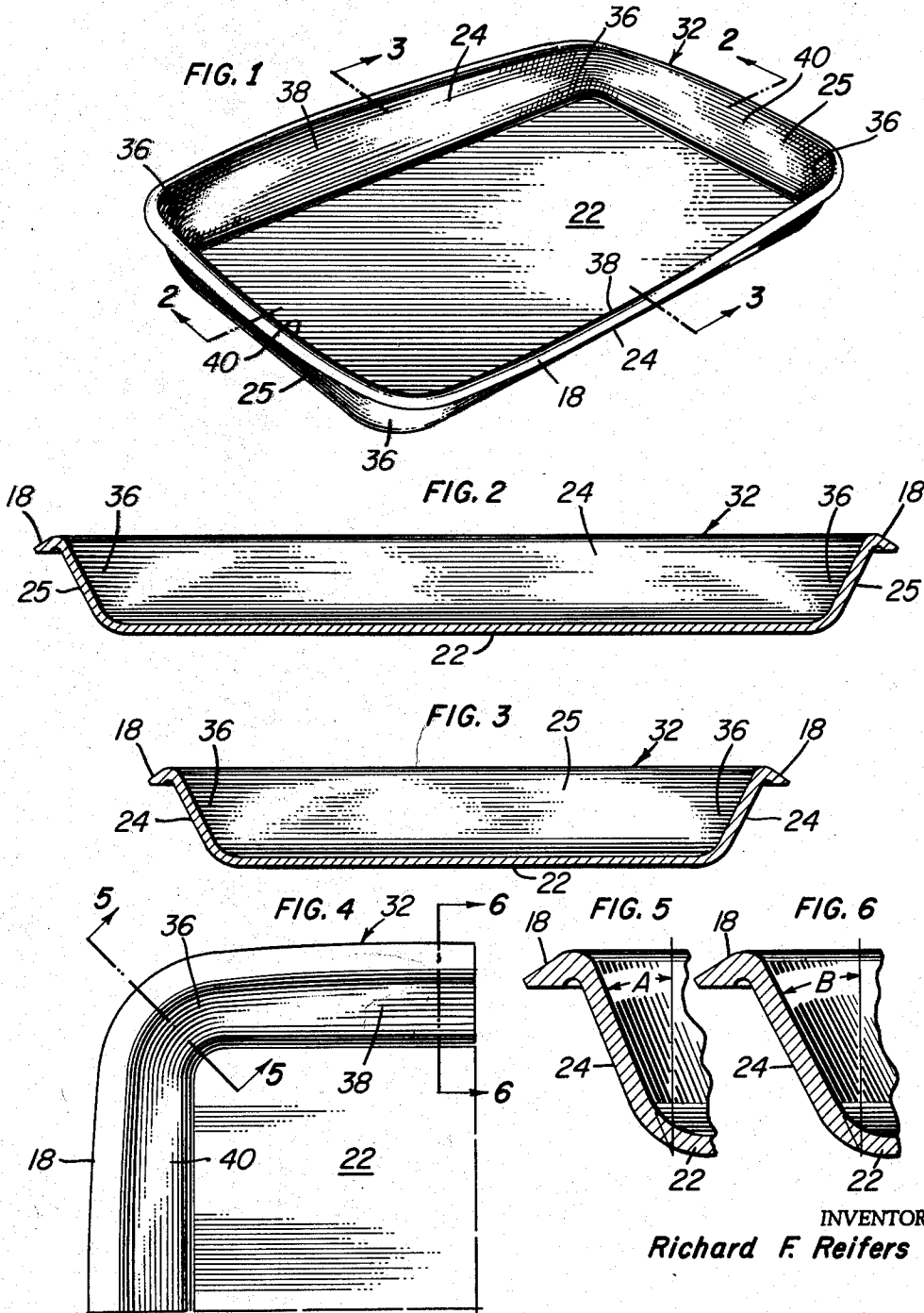
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3,185,371

MOLDED PULP ARTICLE

Filed May 24, 1963

4 Sheets-Sheet 1



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FIG. 8

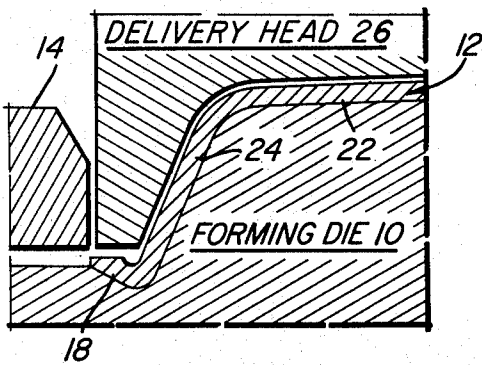


FIG. 7

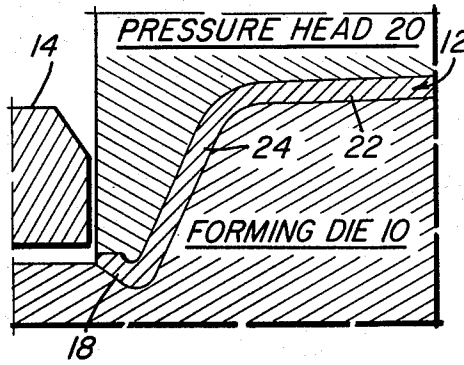
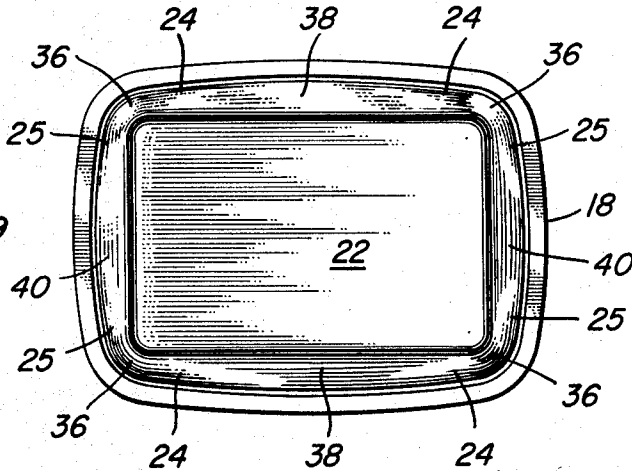


FIG. 9



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FIG. 10

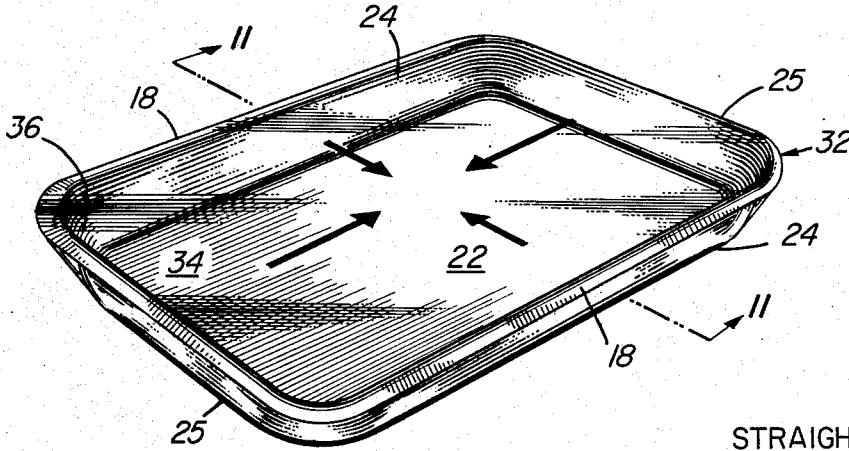


FIG. 11

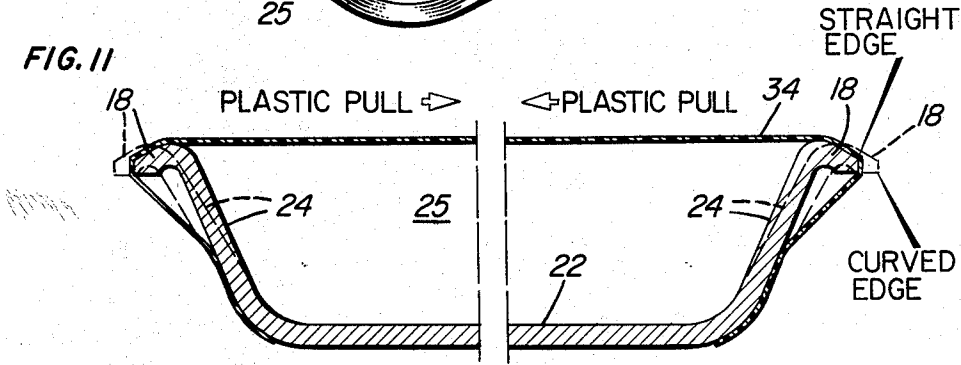


FIG. 12

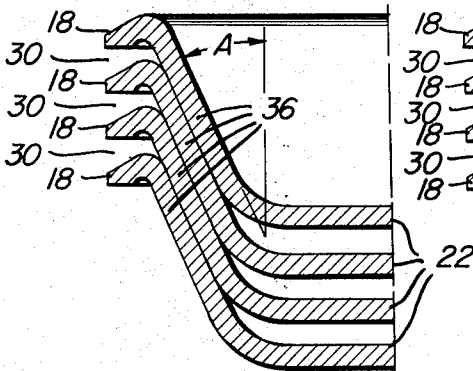
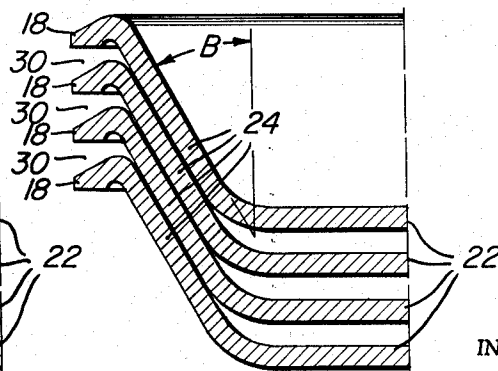


FIG. 13



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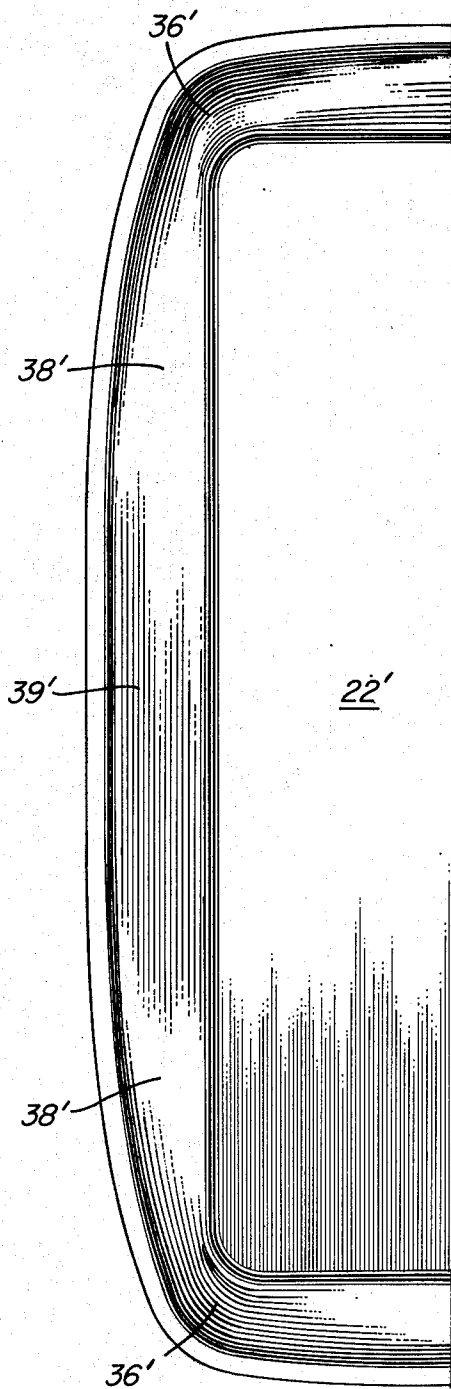
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FIG. 14



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MOLDED PULP ARTICLE

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12 Claims. (Cl. 229—2.5)

This invention relates generally to molded pulp arti-
cles and more particularly to a molded pulp container or
tray especially suitable for packaging foods, particularly
meat.

Food trays produced from molded pulp are customarily
used in most retail food markets today particularly for
packaging fresh meat, poultry, fish or other commodities.
These containers are usually in the form of a shallow,
generally rectangular tray, and a preferably transparent
sheet of cellophane or a heat shrinkable film is lightly
wrapped or shrunk around the tray to form a package.

Food trays play an important part in merchandising
various commodities, and the ultimate appearance of the
finished package is an important factor in the sale of the
product, i.e., a neat, clean-appearing package has a defi-
nite relationship to the nature of the goods being sold,
while at times a package can either actually or psycho-
logically be a sales deterrent.

Additionally, with the advent of production line pack-
aging, a vertical stack of food trays is generally stored
in a hopper or magazine for either mechanical and/or
manual denesting, and it is important that molded pulp
trays be readily denestable by providing sufficient denest-
ing clearances between adjacent lip portions of the nested
trays.

Further, the trays must be strong enough to resist
rough handling and retain their shape and appearance.

Additionally, food trays are a "one-use item," being
discarded by the ultimate consumer, and thus the cost
thereof must be kept at a minimum since it is a mer-
chandising cost, although the strength, neat appearance
and ability to form a good package must be kept at a
maximum. Trays previously manufactured were very
satisfactory for the purpose for which they were intended.
However, a constant endeavor is being made to afford
even better trays without an increase in cost to the re-
tailer or ultimate consumer.

Paperboard trays, i.e. cut and scored trays, are not
especially adapted for use with shrink films, since the side
walls of such board trays do not have the requisite side
wall characteristics to afford uniformly appearing pack-
ages after a film is shrunk thereon.

Present day molded pulp trays were first produced
without an upper peripheral lip. These trays were highly
practical and satisfactory for the purpose intended.
Later, an upper peripheral lip was added to the molded
trays, and these trays lent themselves to form a highly
desirable package when wrapped with regular films, such
as cellophane, saran, as well as polyethylene.

The present invention involves a novel tray and pack-
age and incorporates all of the desirable advantages and
benefits of prior art trays and is especially designed for
use with or without heat shrinkable films of the future.
This novel tray and the package formed therewith give
increased benefits to the consumer without an apprecia-
ble increase in cost.

A primary object of the present invention is to provide
an improved molded pulp food tray.

Another object of the present invention is to provide
a molded pulp food tray which affords a substantially
rectangular appearance before and after a package is
formed therewith, which is adapted for use with a pack-
age forming wrapper, and which provides for special

structure and shape maintaining the desired rectangular
shape and resistance to internal forces on side walls when
forming a package utilizing a shrink film.

A still further object of the present invention is to pro-
vide a novel food tray which includes an improved side
wall structure insuring improved nesting and denesting
clearances as well as properly distributing the load im-
posed on a lowermost of a stack of nested trays.

And yet another object of the present invention is to
provide a novel package which includes improved struc-
ture to present a substantially rectangularly appearing
package of greater strength than was heretofore thought
possible.

A still further object of the present invention is to pro-
vide a novel food tray of the character mentioned above
in which the peripheral margins of the bottom wall are
in a right angular relation, and these margins are flanked
by side walls at a right angular relation although the side
walls incorporate an intermediate substantially planar
segment flanked by arcuate corners into which the seg-
ment merges, the side walls incorporating outwardly
bowed margins affording a "Grecian column" effect.

And yet another object of the invention, in conform-
ance with those set forth, is to provide a novel tray which
has an unusual side wall strength to resist deformation
due to the novel side wall configuration, as well as pro-
viding a rectangular base affording means for properly
orienting and truing up the trays during loading and
package forming with conventional wrappers or shrink
films.

Other objects and the nature and advantages of the
instant invention will be apparent from the following
description taken in conjunction with the accompanying
drawings, wherein:

FIG. 1 is a perspective view of the novel food tray of
the invention;

FIG. 2 is a vertical section taken substantially on the
plane of line 2—2 of FIG. 1;

FIG. 3 is a vertical section taken substantially on the
plane of line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary plan view of a por-
tion of FIG. 1 showing the outward bowing of the pe-
ripheral edges thereof;

FIG. 5 is an enlarged vertical section taken substan-
tially on the plane of line 5—5 of FIG. 4 and showing
the side wall angle at a corner with respect to a line per-
pendicular to a horizontal plane;

FIG. 6 is an enlarged vertical section taken substan-
tially on the plane of line 6—6 of FIG. 4, showing an
angle similar to FIG. 5 through a medial portion of the
side wall;

FIG. 7 is a diagrammatic view, in section, showing
the shape of the initially deposited tray preform and
the manner in which the peripheral flange or edge of the
tray is formed by a pressure head;

FIG. 8 is a view similar to FIG. 7 showing the man-
ner in which the tray preform is removed from a forming die
by means of a delivery head;

FIG. 9 is a bottom plan view of the tray on a reduced
scale;

FIG. 10 is a perspective view of a package formed by
using a shrink film wrapper on the tray illustrated in
FIG. 1, and showing by means of arrows the manner
in which tension is applied to the tray during shrinking
of the wrapper and the rectangular shape retained in the
completed package;

FIG. 11 is a vertical section taken substantially on
the plane of line 11—11 of FIG. 10, indicating by means
of legends and phantom lines the manner in which a
shrink wrapper will orient the tray into the substantially
rectangular condition shown in FIG. 10;

FIG. 12 is a fragmentary vertical section through a plurality of nested trays of the invention taken substantially through a corner similar to FIG. 5;

FIG. 13 is a view similar to FIG. 12 showing the "daylight" or clearance between the side or end walls of the nested trays, this section being substantially through a side wall similar to FIG. 6; and

FIG. 14 is a fragmentary bottom plan view, similar to the side wall portion of FIG. 9, showing how a relatively long side wall includes a substantially rectangular planar portion flanked by halves of arcuate segments.

Referring to the drawings in detail, the novel food tray is produced from a pulp slurry by means of conventional suction molding equipment.

Referring first to FIGS. 7 and 8, the fragmentary portion of a conventional foraminous forming die is indicated generally at 10 and will have deposited thereon, when immersed in a pulp slurry vat, a tray preform 12, the peripheral edges thereof being masked by a conventional deckle ring 14. The preform 12 is removed from the forming die 10 by means of a delivery head 16, as is conventional, the preform 12 being formed with a reformed, angular peripheral edge 18 as clearly seen in FIG. 7.

The preform 12 is engaged by a pressure head 20, while still immersed, to form the final tray shape including a flat bottom 22, angular side walls 24 and the angular peripheral flange 18.

In the absence of the application of pressure by a pressure head of the character mentioned above, the surface of a molded article opposite that surface formed on the forming die is relatively rough and of a porous character.

The improved trays of the present invention particularly present a clean and uniform, relatively smooth, outer surface on the final product.

After the preform 12 is pressed, it is removed from the forming die 10 by means of a suitably conformed delivery head 26 by means of a combination of air pressure from within the forming die 10 and suction in the delivery head 26. The delivery head profile, as seen in FIG. 8, in no way interferes with the previously formed configuration of the tray preform.

It will be noted that the preformed, substantially rigid flange 18 is disposed in angular relation with respect to the general plane of the side wall 24 to provide an unusual structural strength. In addition to providing a geometric or structural shape which is of inherent and great strength, it will be noted that the pulp of the preform is compressed at the flange to provide a smooth, compressed, strong peripheral reinforcing rib.

It will be observed in FIGS. 12 and 13 that the peripheral, angular flanges 18 provide a clear and unobstructed denesting space 30 for receiving cooperating portions of denesting equipment (not shown) therein. Additionally, due to application of the pressure head and the formation of the peripheral flange 18, trays are produced with uniform accuracy to insure proper nesting, as well as a uniform appearance and function.

After the food or the like has been disposed in a tray, a generally transparent, heat shrink wrapper of polyethylene or the like is disposed in overlying relationship with respect to the open top of the tray and the peripheral flange thereof. This wrapper, i.e. the package formed with the food and food tray, is then subjected to a relatively hot blast of air, for example, which causes the wrapper to shrink and become taut. The wrapper, when shrinking, does so uniformly; however, if the tray has a long length, the longer dimension will have proportionately more shrinkage lengthwise than that portion of the wrapper disposed widthwise. This results in greater tension forces on the walls of the food tray opposing the proportionately greater shrinkage of the wrapper. The present tray has an unusual side wall strength against inward deformation, and thus adequately resists all of the forces due to any disproportionate film shrinkage.

The novel food tray of the invention is indicated generally at 32 in FIG. 1. The tray 32, as previously mentioned, includes a planar bottom wall 22, side walls 24 and end walls 25. Extending about the upper edge of the walls 24 and 25 and integral therewith is the downwardly angled, reformed peripheral edge 18. The downwardly angled flange 18 is approximately at right angles to the general angle of the side and end walls and provides an extremely rigid and structurally strong reinforcement for the tray as well as, due to the reforming pressure, provides a very clean and neat appearing tray.

Additionally, this tray utilizes in effect a "Grecian column" technique in that the outer margins of the flange 18 curve slightly outwardly, and when observing the tray, one immediately receives the impression that the tray is rectangular. Not only does the "Grecian column" effect present a rectangular appearance to the tray prior to forming a package, as will be described in detail with respect to FIGS. 10 and 11, for example, but when a shrink wrapper is disposed on the food tray and it is shrunk into the condition shown in FIGS. 10 and 11, tension, which is caused due to the shrinking of the film, which may be twice as much lengthwise as widthwise, for example, as indicated by the direction arrows in FIG. 10, results in the peripheral edges of the tray being drawn to a configuration or closely approaching a true rectangle.

The resulting package shown in FIGS. 10 and 11 clearly emphasizes the manner in which the relatively shallow, arcuate periphery of the tray of the invention compensates for the application of the shrink film or wrapper 34. Observe, for example, the legends "curved edge" and "straight edge" of FIG. 11, in relation to the "plastic pull" caused by the shrink film 34.

The arc of the flange 18 bordering end walls 25 is appreciably greater than one might expect in order to compensate for the increased tension due to shrinking of the film lengthwise of the tray.

The angular relationship at the corners 36 of the tray 32, as compared with the angular relationship at substantially the mid-point of the side and end walls 24 and 25, respectively (see FIGS. 5 and 6 and FIGS. 12 and 13) is distinguishably different. It will be observed that the angle A of FIG. 5 is appreciably less than the angle B of FIG. 6, the angles varying, depending upon the size and depth of the food trays, and thus the lesser angle of the corners 36 of the food tray is that which determines the stacking interval of the nested cartons.

The angular variance, mentioned above, is very subtle when observing the finished product; however, upon considering the drawings, it will be observed that substantially planar, arcuate segments are formed in these side walls 24 and 25 as indicated at 38, 39 and 40. These arcuate segments are essentially planar, extending generally from beneath the peripheral flange 18 of the tray and merging on a radius into the bottom wall 22 of the tray, and at opposite ends merging into the arcuate corners 36 of the tray. The arcuate segments 38 and 40 are at a greater angle than the corners 36 and accordingly do not interfere with ready denesting of the improved food tray inasmuch as the shallow angles at the corners 36, as previously mentioned, control the nesting relationship of a stack of trays (see FIGS. 12 and 13).

The changing angle between mid-points of the end and side walls 24 and 25, respectively, in conjunction with the downwardly turned peripheral edge or flange 18, provides additional structural rigidifying means for the finished tray.

Further, the previously mentioned "Grecian column" effect, in addition to providing a neater appearing tray and package, insures that the peripheral flange will project out sufficiently to cooperate with mechanical or manually operated denesting apparatus. The denesting gap 30, previously mentioned with respect to FIGS. 12 and 13, will readily accommodate denesting lips, etc.

It will be observed from FIGS. 12 and 13 that the angle A at corners 36 controls the nesting interval between adjacent trays, while the greater angle B at the mid-point of the side walls (also greater at mid-point of end walls) provides a greater amount of daylight or clearance between corresponding portions of the side and end walls.

Considering FIG. 14, there is disclosed one-half of bottom of a relatively long food tray. In order to attain proper terminal merging of the arcuate portions 38' with the corners 36' of this type of tray, a central portion 39' of substantially rectangular shape is disposed between the segments 38'.

It will be observed in FIG. 14 that the angles of corners 36' are much less than the angle at portions 38' and 39'. In this manner, it is possible to obtain an angular merging relationship between portions 36', 38' as is afforded in a smaller dimensioned tray at 36, 38 of FIG. 9, for example. As previously mentioned, lengthwise shrinkage of films will far exceed widthwise shrinkage, and thus the arc bordering the end walls will be such as to compensate for the greater shrinkage per lineal measurement of wrap-per along the length.

In each of the disclosed embodiments, it will be noted that the bottom walls 22, 22' are each bordered by peripheral margins in true right angular relation connected by an arc at the base of the corners. The true rectangular relation provides means whereby design of the tray is facilitated and in which the final product may be readily related and oriented in denesting equipment, as well as permitting the tray to be readily oriented on packing and wrapping equipment.

Further, the rectangularly related bottom wall margins are connected medially to the base of the substantially planar side wall segments 38 or 40 in FIGS. 1-9, or the substantially planar side wall segments 38', 39', for example, in FIG. 16. It will be recalled that the essentially planar segments 38, 40 and 38', 39' merge into arcuate side wall portions 36 or 36'. The side wall geometry, i.e. rectangular base, arcuate corners flanking substantially planar segments, arcuate side wall margins, and peripheral flanges, evolves an unusual resistance to inward deformation or deflection, i.e. about 1/2 inch in conventional sized trays. Not only is an unusual wall strength provided, but a true rectangular base is provided with the pleasing appearance of the arcuate side wall margins to afford the previously mentioned "Grecian column" effect.

The term "Grecian column" effect is that generally recognized by architects wherein an exceptionally long column is provided with a slightly concave margin when viewed in elevation, which gives an immediate optical appearance of true linear margins rather than inward bowing, which might occur if this technique is not utilized.

It will be understood by those skilled in the art that the unusually strong side walls are supplemented by the angular peripheral flange 18. However, it is readily apparent that the novel structure and function of the side walls, exclusive of the peripheral flanges 18 (this embodiment now shown) will afford an unusually strong, practical and satisfactory tray which reduces the amount of pulp used to produce the cartons.

The angular variations at the tray corners, as compared with the corresponding angle at intermediate wall portions, affords distinct advantages in a stack of trays.

In a vertical stack of trays, "male end down," i.e. a stack where the trays open upwardly, compressive or inward forces due to vertical loads are substantially eliminated due to the controlled "daylight" interval illustrated in FIG. 13, for example. The angular control of the tray walls not only provides a controlled nesting interval and places maximum loading at the relatively stronger corners, but also reduces the frictional contact area between adjacent trays and prevents any excessive inward compression forces at the "female" end of a stack. The angular control maintains the tray dimensions substantially uni-

form at both the upper and lower ends of the tray stack, i.e. the trays in the stack are in substantially the same form in a stack as they are when unstacked.

Thus there has been disclosed and described a novel food tray which provides accurate and desired denesting, provides a neat-appearing tray forming a neat and uniform package, and provides an inherently stronger and more readily denestable tray.

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A molded container for food products or the like comprising a shallow tray having a bottom wall, upstanding side and end walls integral with said bottom wall and having a peripheral margin, said side and end walls being disposed in substantially rectangular relation and terminating in arcuate corners, an internal angle between said side wall and said bottom wall at a central portion of said arcuate corners being less than a comparable angle between said side and end wall and said bottom wall at medial portions of said side and end walls.
2. A molded container as set forth in claim 1 in which said peripheral margin bows outwardly in a general arc from said corners along at least one of said side walls.
3. A molded container as set forth in claim 1 in which said peripheral margin includes a bordering flange extending downwardly from said end and side walls and at said corners at a substantially right angle and comprises, with respect to said side walls, compressed pulp material.
4. A molded container as set forth in claim 1 in which said bottom is bordered by right angularly related margins, said peripheral margin of said side and end walls being bowed outwardly from said arcuate corners.
5. A container as set forth in claim 1 in which said end and side walls include an intermediate, substantially planar segment having an arcuate margin adjacent said peripheral margin, terminal ends of said segment merging into said arcuate corners, and a substantially linear margin merging into said bottom wall.
6. A container as set forth in claim 5, in which said peripheral margin bows outwardly in a general arc from said corners along at least one of said side walls.
7. A container as set forth in claim 6, in which said peripheral margin includes a bordering flange extending downwardly from said end and side walls and at said corners at substantially a right angle and comprises compressed pulp material.
8. In a molded container for food products or the like and including a bottom wall bordered by upstanding walls, the improvement comprising a linear margin bordering one side of said bottom wall at the base of one of said bordering walls, said one bordering wall comprising an intermediate substantially planar portion merging into flanking arcuate corners joining adjacent bordering walls.
9. The structure of claim 8 in which said one bordering wall includes an upper peripheral margin bowing outwardly from said flanking arcuate corners.
10. The structure of claim 8 in which said one bordering wall includes an upper peripheral margin extending angularly and downwardly from the upper edge of said one bordering wall.
11. The structure of claim 8 in which the internal angle medially of said one bordering wall is at a greater angle than the corresponding internal angle medially through one of said arcuate corners.
12. A nested stack of molded containers, each container comprising a shallow tray having a bottom wall, upstanding side and end walls integral with said bottom wall and having a peripheral margin, said side and end walls being disposed in substantially rectangular relation and terminating in arcuate corners, an internal angle between said side wall and said bottom wall at a central portion of said arcuate corners being less than a comparable angle

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between said side and end wall and said bottom wall at medial portions of said side and end walls, the angular variations between the corner and end walls providing a "daylight" portion between adjacent corresponding intermediate wall portions and engagement at the corners between adjacent trays of a stack facilitating tray denesting, providing a minimum frictional contact area between adjacent trays, and at the stack ends maintaining optimum tray dimensions to substantially those at which the trays were originally produced prior to stacking.

8

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