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3,224,569
CLASP PACKING TRAY
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Fig. 5

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Fig. 6


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Fig. 8


Fig. 9


Fig. 10

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CLASP PACKING TRAY
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10 Claims. (Cl. 206-45.31)
This invention relates to the packing of fruits and vegetables, and more particularly to a molded packing tray and a method of packing articles in the molded packing tray.

An object of the invention is to provide a packing tray which clasps articles packed therein and holds the articles against movement relative thereto during shipment, and a method of loading the tray.

Another object of the invention is to provide a packing tray adapted to hold articles therein in staggered rows and which also is adapted to be stacked on top of another identical tray holding articles therein in staggered rows.

A further object of the invention is to provide a packing tray which will grip the sides of articles packed therein and which may be flexed open for loading.

Another object of the invention is to provide a packing tray having deep gripping pocket portions which may be manufactured easily.
Another object of the invention is to provide a packing tray serving to hold articles to be shipped therein and also provided with a transparent cover portion holding the tray in a position gripping the articles and forming with the tray an attractive merchandising package.

The invention provides a molded packing tray and a method of packing articles in the tray. The tray may comprise a plurality of parallel channels having flexible sidewalls and flexible hinge portions connecting the adjacent sidewalls of adjacent channels, each channel hav ing a plurality of pocket portions spaced therealong with restricted portions between the pocket portions and the sidewalls being of such a height and the hinge portions being of such a width that portions of the sidewalls overhang portions of rounded articles positioned in the pockets. The tray may be expanded laterally of the channels to open them to receive articles and then contracted laterally to cause the channel walls to grip the articles. A transparent covering may be secured to given portions of the tray to form an attractive package with the tray and hold the tray in gripping engagement with the articles.

A complete understanding of the invention may be obtained from the following detailed description of a molded packing tray and a method of packing the tray forming specific embodiments thereof, when read in conjunction with the appended drawings, in which:
FIG. 1 is a top plan view of a fruit packing lug having molded packing trays forming one embodiment of the invention;

FIG. 2 is a vertical section taken along line $\mathbf{2}-\mathbf{2}$ of FIG. 1;

FIG. 3 is a vertical section taken along line 3-3 of FIG. 2;

FIG. 4 is a top plan view of a stack of the molded trays of FIG. 1 preparatory to packing fruit articles therein;

FIG. 5 is a vertical section of the tray of FIG. 1 showing the tray in an expanded condition;

FIG. 6 is a vertical section of a package including the tray of FIG. 1;

FIG. 7 is an enlarged vertical section of the package of FIG. 6.

FIG. 8 is a fragmentary top plan view of a tray forming an alternate embodiment of the invention;

FIG. 9 is a vertical section taken along line 9-9 of FIG. 8; and

FIG. 10 is a vertical section of a fruit packing lug having the molded packing trays of FIG. 8.

Referring now in detail to the drawings, there is shown therein a plurality of molded packing trays 10 of pulp, or if desired, plastic material. The trays are identical in construction and serve to carry articles such as, for example, apples 12 in layers in a lug or box 14 . The trays hold and grip the apples so that there is no movement of the apples during transportation thereof thereby avoiding any chafing and abrasions. As illustrated in FIGS. 1 and 3 , each tray 10 has a plurality of arcuate, flexible hinge portions 16 extending generally parallel to one another and side flange portions 18 adapted to be engaged by the sidewalls of the box 14 and compress the tray laterally into gripping engagement with the apples 12. The flexible hinge portions 16 are connected at one side of each to upper, overhanging portions 20 of sidewalls 21. The portions 20 are adapted to overhang the portions of the apples 12 above the centers of the apples and urge the apples down in pockets 22 in which the apples are packed. Each pair of adjacent sidewalls 21 have opposed, closely spaced portions 24 alternating with more widely spaced portions 26 . The portions 26 of the sidewalls form the pockets 22 .

The sidewall portions 24 bracket spring cushion members 28 raised relative to the bottoms of the pocket portions 22. The members 28 are resilient and rest on the upper portions of the articles or apples 12 in the tray 10 just below. The hinges 16 and the sidewalls 21 , in effect, undulate to form the enlarged pockets 22 alternating with restricted portions 29 intermediate the pockets 22. Each tray 10 may be considered to have a plurality of generally parallel channels of undulating sidewalls 21 to form the enlarged article-receiving pockets 22 separated by the restricted portions 29 . The pockets 22 in each channel are stagged relative to the pockets 22 in each adjacent channel.

As illustrated in FIG. 1, the flexibility of the hinge portions 16 and the sidewalls 21 permit each pocket portion 22 to be expanded more by a larger article 12 packed therein than by a smaller article, and also permit substantially smaller articles $\mathbf{1 2}$ to be packed in pockets adjacent to the larger articles and still be gripped securely. The sidewalls extend at least slightly above the middle of even the largest article $\mathbf{I} 2$ so as to press the articles downwardly against the bottoms of the pockets as the sidewalls grip the articles. The tray pockets also grip securely mixtures of articles of small, large and intermediate sizes. This permits the fruit or other articles packed therein to have a much larger range of sizes than has been possible with trays known hitherto. Also, because of the flexibility of the hinge portions 16 and the sidewalls, the trays 10 are very easily molded while in expanded condition so that they may be easily stripped from molding core portions or shaping portions (not shown) during their manufacture. This normal open or expanded condition facilitates packing the articles 12 in the pockets which are open sufficiently to readily receive the articles.

The flexibility of the hinge portions 16 and sidewalls 21 also permits the trays to be contracted in a direction laterally of the channels to close the pockets 22 to clasp the articles 12 therein. The trays clasp the articles and retain them therein during handling and placing of the tray in a box or lug, which holds the trays in their contracted or clasping condition. Each tray may be packed by moving it longitudinally past a loading station with at least the portion of the tray receiving fruit at the loading station laterally expanded, as best illustrated in FIG. 5, for insertion of fruit into the pockets 22. The loaded row
is moved out from under the loading station and the next transverse row of pockets is moved to the loading station. This permits a continuous loading of each tray.
FIG. 4 illustrates a stack of the trays $\mathbf{1 0}$ adapted to be loaded or packed with articles and placed in the lug 14 with each of the trays $\mathbf{1 0}$ being identical. However, every alternate tray is reversed end-to-end relative to the trays immediately adjacent thereto. This causes the loaded trays, when they are stacked one on top of another in the same order and relative positions, to have the articles in one of the trays staggered both along the tray relative to the articles held by the tray immediately below and also staggered relative to the articles held by the tray immediately thereabove. This is accomplished by having in each tray an even number of rows of pockets transverse to the channels where there is an odd number of channels (as in the embodiment disclosed in FIG. 4) or by having in each tray an odd number of rows of pockets transverse to the channels where there is an even number of channels. Where the trays are so stacked with alternate ones thereof reversed relative to the other as illustrated in FIG. 4, the trays are packed sequentially in the order in which they are stacked and then are placed in the lugs 14 also in this order and positions relative to each other, each of the trays will carry the articles staggered relative to the articles positioned in each adjacent tray, above and below, both longitudinally and transversely and the spring cusions 23 will rest on the articles in the tray below.

FIGS. 6 and 7 illustrate an attractive display package in which the articles 12 in the tray 10 are covered by a known heat shrinkable, transparent plastic cover 36, which is placed over the tray and is secured to spots 37 on upper portions of the tray such as the hinge portions 16 and the outer flanges 18. After the cover 36 is so secured to the tray, the cover is heated to shrink the cover to the articles, cause the cover to grip the articles 12 and also compress the tray laterally to cause the walls thereof to grip the articles securely. If desired a strap 38 of plastic material may be suitably adhered to the tray 18 in a position extending across the bottom of the tray to keep the tray 10 from bending into a position in which it would be concave upwardly, as viewed in FIG. 6. As best illustrated in FIG. 7, the cover 36 may be adhered to the high points on the tray 10 by spots or coatings 37 of a known material adherent to the covering and the tray and applied to the upper portions of the hinges 16 . The material of the spots 37 coating the hinges 16 is a well known material which will adhere strongly to the material of the sheet $\mathbf{3 6}$ and extends into the interstices of the tray 10 when the tray is composed of molded pulp, or which adheres to the tray $\mathbf{1 0}$ very tenaciously when the tray 10 is composed of a plastic material.

The above-described trays 10 firmly clasp or grip the articles 12 when the trays are compressed slightly laterally as in the lug 14. Hence, the articles cannot move at all relative to the tray and chafing of the articles is avoided completely. Such chafing also is avoided between trays just above and resting on the articles in the lower tray by reason of the box 14 compressing the tray laterally, and the frictional force between the box and the tray prevents longitudinal movement of the tray along with the hinge portions 16 which resist compressive forces along their length.

Trays 40 (FIGS. 8-10) forming an alternate embodiment ofthe invention are generally similar to the trays 10 but are sufficiently deep and are so constructed that each tray 40 that is below another tray 40 engages and supports the latter tray so that the articles 12 packed in the trays do not suport the trays thereabove. Each tray 40 includes a plurality of generally parallel, but unduating, hinge portions 46 connecting sidewalls 48 , which also may be somewhat flexible. The trays 40 also have side flange portions 50. Each tray 40 has deep pockets 52 formed therein in a pattern like that of the pockets 22 . The pockets 52 preferably are slightly deeper than the
diameter of articles to be held therein, and are separated from each other by more narrow openings 54. Each hinge portion 46 is undulating in width as is illustrated in FIG. 8 so as to form opposed pairs of rounded, projecting supports 56 which are designed to be engaged by and support the bottom walls of the pockets 52 of the tray immediately thereabove. The sidewalls 48 are of sufficient height as to position the supports 56 at a height holding the upper tray completely out of contact with articles 12 in the lower tray. This is also facilitated by the close positioning of each pair of the supports 56 and by having the bottom of each pocket 52 project downwardly susbtantially beyond the bottom of each narrow portion 54 at the side of that pocket. By so positioning the bottom of each narrow portion 54 above the bottoms of the laterally adjacent pockets 52 , the overall height of each tray may be minimized. This minimizing of height also is aided by the close spacing of each pair of the projecting supports 56 and by locating each support 56 as high as possible. The supports $\mathbf{5 6}$ also may be formed so as to project somewhat upwardly, but preferably have gently rounded corner portions engaging the trays above. The corners of the supports 56 also are somewhat spherical to provide the necessary stiffness to support the trays thereabove.
The trays 10 and $\mathbf{4 0}$ are easily packed since they are molded in expanded condition and then compressed within the lug to secure them in gripping positions. Furthermore, the trays can be molded continuously and then cut to provide the number of transverse rows desired in a single tray. Also, when identical trays have an odd number of channels and an even number of staggered transverse rows of pockets or when identical trays have an even number of channels and an odd number of staggered trasverse rows of pockets, the trays may be stacked as illustrated in FIG. 4 by turning each alternate tray $180^{\circ}$ and the trays may be of the same configuration and yet be in the precise positions desired for packing and subsequent stacking in the lugs 14 with all adjacent rows of articles staggered relative to each other. Thus, it is not necessary to provide two different trays in order to so stagger the articles.
It will be obvious to those having ordinary skill in the art that various changes may be made in the details of the preferred embodiment of the present invention without departing from the spirit of the invention. Therefore, it is not intended to limit the scope of the present invention to the above-described preferred embodiments and this scope should only be determined by the following claims.

I claim:

1. A molded packing tray for holding a plurality of rounded objects having a predetermined maximum diameter,
said tray being formed with a plurality of upstanding walls defining a plurality of channels open at each of the opposite ends of said tray, the adjacent walls of adjacent channels being connected by flexible hinge portions to enable said tray to be compressed laterally,
said walls being continuous in the longitudinal direction of the tray and undulating cooperatively with one another so as to define a plurality of longitudinally spaced pockets along each channel for receiving said objects one in each pocket, the walls between said pockets being spaced relatively more closely together to define restricted portions of a width less than said diameter to restrain longitudinal movement of an object along a channel,
the pocket portions of each channel being staggered relative to the pocket portions of the immediately adjacent channels,
said walls having a height relative to the bottom of said pockets greater than one-half said maximum diameter, the upper portions of said walls overbang-
ing said objects when the same are placed in said pockets and said tray compressed laterally.
2. A molded pulp packing tray for holding a plurality of rounded objects having a predetermined maximum diameter,
said tray comprising a plurality of longitudinally extending upstanding walls pairs of which are connected by transversely rounded bottom portions to define a plurality of parallel U-shaped channels, said channels being open at each end and said walls being flexible laterally with respect to the bottom portion of said channels, the adjacent walls of adjacent channels being connected by flexible hinge portions to enable said tray to be compressed laterally,
said walls undulating cooperatively with one another so as to define a plurality of longitudinally spaced pockets along each channel for receiving said objects, the walls between said pockets being spaced relatively more closely together and the bottom portion being raised between said pockets to define restricted channel portions to restrain longitudinal movement of an article along a channel,
the pocket portions of each channel being staggered relative to the pocket portions of the immediately adjacent channels,
said walls having a height relative to the bottom of said pockets greater than one-half said maximum diameter, the upper portions of said walls overhanging said objects when the same are placed in said pockets and said tray is compressed laterally,
said raised bottom portions each defining a spring bridge portion to engage an object positioned in a tray beneath said molded pulp packing tray.
3. An assembly for shipping a plurality of rounded objects having a predetermined maximum diameter comprising a rigid box-like container of rectangular outline,
a plurality of molded packing trays of rectangular outline for holding a plurality of said rounded objects stacked in said container,
each tray being formed with a plurality of upstanding walls defining a plurality of channels open at each of the opposite ends thereof, the adjacent walls of adjacent channels being connected by flexible hinge portions,
the normal width of said trays in the direction normal to said channels being greater than the width of said container and said trays being compressible laterally so as to fit within said container, the length of said trays parallel to said channels being equal to the length of said container,
said walls of each tray undulating cooperatively with one another so as to define along each channel for receiving said objects, a plurality of longitudinally spaced pockets having a normal width substantially equal to said object diameter, the walls between said pockets being spaced relatively more closely together to define restricted portions to restrain longitudinal movement of an object along a channel,
the pocket portions of each channel being staggered relative to the pocket portions of the immediately adjacent channels,
said walls having a height relative to the bottom of said pockets greater than one-half said maximum diameter, the upper portions of said walls overhanging said objects when the same are placed in said pockets and said trays are compressed laterally and fitted into said container.
4. A package comprising,
a molded packing tray for holding a plurality of rounded objects having predetermined minimum and miximum diameter, said tray being formed with a plurality of upstanding walls defining a plurality of channels open at each end thereof, the adjacent walls of adjacent channels being connected by flexible
hinge portions whereby said tray may be compressed laterally,
said walls being continuous in the longitudinal direction and undulating cooperatively with one another so as to define a plurality of longitudinally spaced pockets along each channel,
a plurality of said objects positioned one in each pocket, the walls between said pockets being spaced relatively more closely together to define restricted portions of a width less than said diameters to restrain longitudinal movement of an object along a channel,
said pocket portions of each channel being staggered relative to the pocket portions of the immediately adjacent channels,
said walls having a height relative to the bottom of said pockets greater than one-half of said maximum diameter, the upper portions of said walls overhanging said objects when the same are placed in said pockets and said tray compressed laterally,
and a cover of flexible transparent material secured under tension to the opposite longitudinal edges of said tray and to said walls and retaining said tray in laterally compressed condition, to secure said objects with said pockets.
5. The package of claim 4 wherein said cover is a heat shrinkable transparent material shrunk to effect lateral compression of said tray.
6. In a shipping assemblage,
a plurality of trays of molded sheet material positioned in stacked relationship,
each tray including a plurality of parallel, upwardly facing channels open at the ends thereof and having pairs of flexible side walls and flexible hinge portions joining the side walls,
each adjacent pair of side walls undulating in opposite directions to define enlarged article-receiving pockets and restricted portions between the pockets,
the portions of the hinge portions at the restricted portions extending above articles in the pockets and adapted to be engaged by the pockets of the tray immediately thereabove to support the last-mentioned tray in a position out of engagement with articles in the tray therebelow.
7. In a packing tray for a plurality of rounded articles of a predetermined maximum diameter,
a flexible sheet member shaped to provide a plurality of parallel, upwardly facing channels open at the ends thereof and having flexible hinge portions and flexible side walls joined together at the upper ends thereof by the flexible hinge portions, whereby the tray can be contracted laterally,
the side walls of each adjacent pair of side walls undulating oppositely along the lengths thereof to define spaced article-receiving pockets separated by constricted portions with the pockets of each channel being staggered relative to the pockets,
the portions of the side walls defining the pockets extending above the midpoints of rounded articles positioned in the pockets and overhanging the rounded articles so as to engage the upper portions of the articles and press the articles downwardly in the pockets when the tray is contracted laterally.
8. A molded packing tray for holding a plurality of rounded objects having a predetermined maximum diameter,
said tray being formed with a plurality of upstanding flexible walls defining a plurality of channels open at each of the opposite ends of said tray, the adjacent walls of adjacent channels being connected by flexible hinge portions to enable said tray to be compressed laterally,
the adjacent pairs of said walls undulating oppositely from one another so as to define a plurality of longitudinally spaced pockets along each channel for receiving said objects one in each pocket, the walls

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between said pockets being spaced relatively more closely together to define restricted portions of a width less than said diameter to restrain longitudinal movement of an object along a channel,
the pocket portions of each channel being staggered relative to the pocket portions of the immediately adjacent channels,
said walls having a height relative to the bottom of said pockets greater than one-half said maximum diameter, the upper portions of said walls overhanging said objects when the same are placed in said pockets and engaging the upper portions of said objects and pressing said objects into the pockets when said tray is compressed laterally.
9. The molded packing tray of claim 8 including
a cover of plastic material secured to the side edges of the tray and holding the tray in compressed condition.
10. In a package for rounded articles,
a flexible tray and having a plurality of channels open at the ends thereof for receiving rounded articles in rows and adapted to support rounded articles in spaced, parallel rows,
and a flexible plastic sheet of heat-shrinkable material

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covering articles in the tray and secured to the tray along the edges of the tray and between rows of articles on the tray to press the rows of articles against the tray.

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