

June 2, 1959

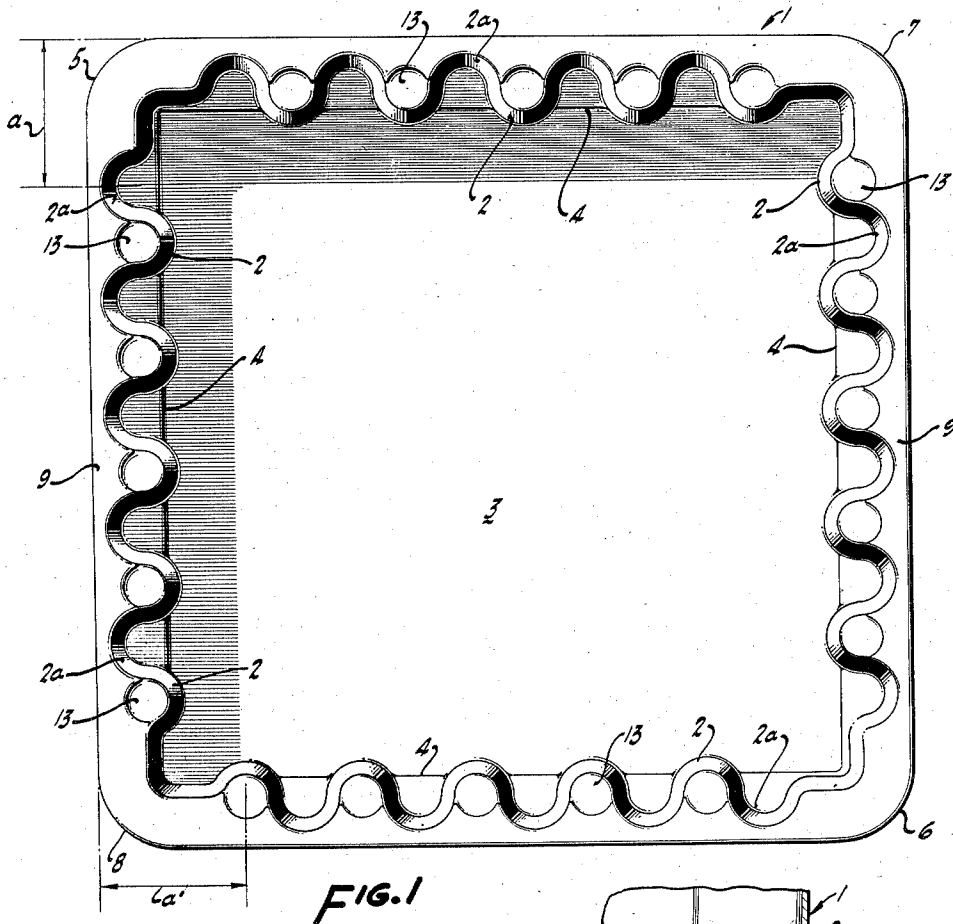
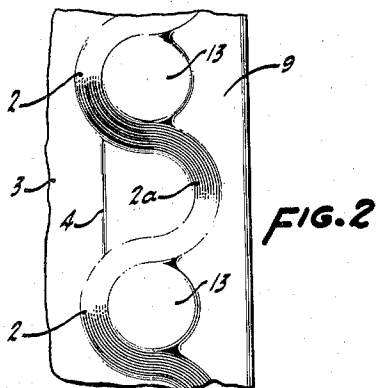
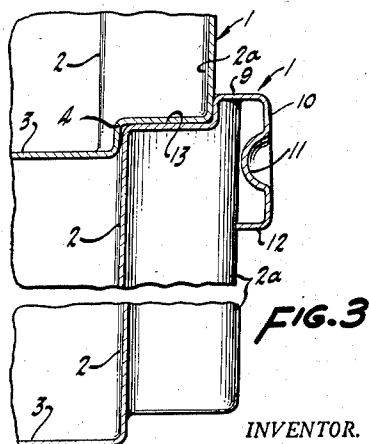
S. D. LAPHAM

2,889,072

NESTING AND STACKING BOX

Filed March 29, 1956

3 Sheets-Sheet 1



INVENTOR.
SIDNEY D. LAPHAM
BY *Mellin and Huscon*

ATTORNEYS

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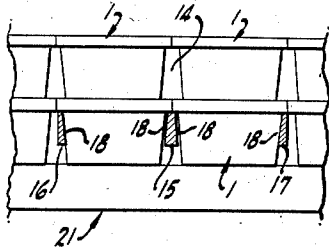


FIG. 5

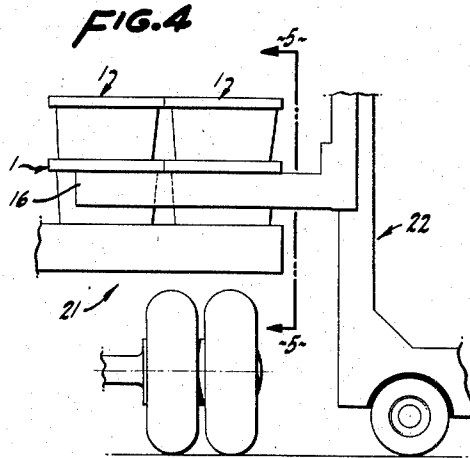


FIG. 4

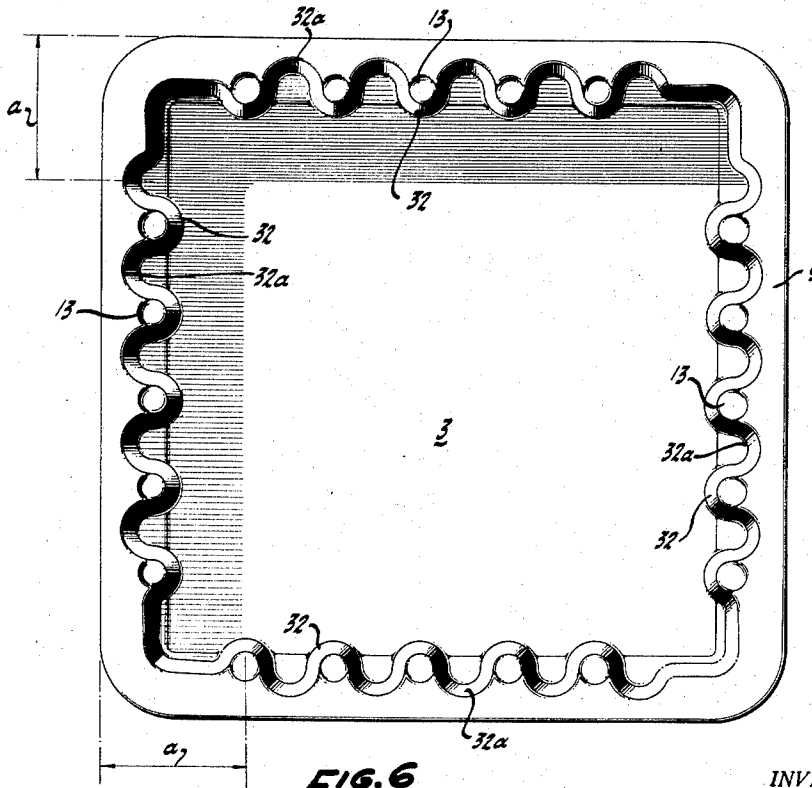


FIG. 6

INVENTOR.
SIDNEY D. LAPHAM
BY *Wells and Hancock*
ATTORNEYS

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FIG-7

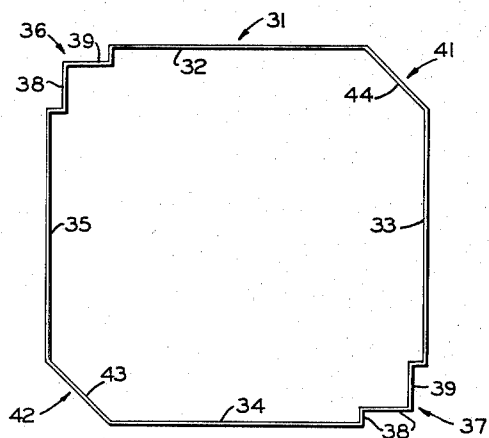


FIG-8

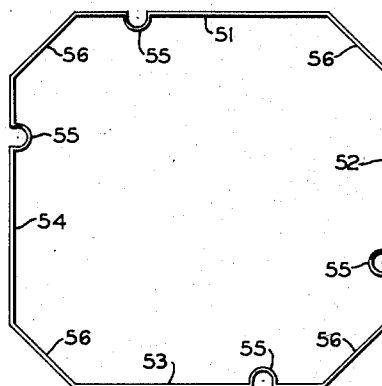
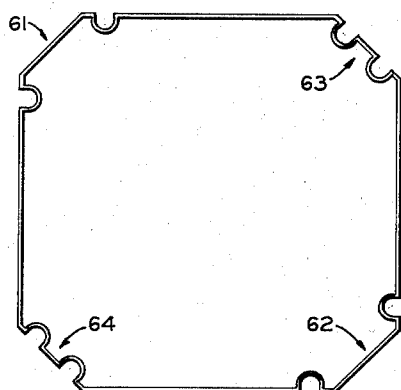


FIG-9



INVENTOR.
SIDNEY D. LAPHAM
BY *Mellin Anne Hauscom*
ATTORNEYS

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2,889,072

NESTING AND STACKING BOX

Sidney D. Lapham, Martinez, Calif.

Application March 29, 1956, Serial No. 574,721

7 Claims. (Cl. 220—97)

This invention relates to and in general has for its object the provision of a square nesting and stacking lug or tote box capable of being switched from its nesting position to its stacking position by rotating it through not more than 90 degrees. This application is a continuation-in-part of my application Serial No. 255,053, filed November 6, 1951, and now abandoned.

In my pending application, Serial No. 255,053, a rectangular nesting and stacking box has been shown, wherein opposed sides thereof are of dissimilar contour, and which box can be changed from its nesting to its stacking position only by rotating it a full 180 degrees. This condition is decidedly inconvenient for it necessitates a two-stage operation. The box must first be turned through substantially 90 degrees, and then the grip thereon reversed before it can be rotated the remainder of the 180 degrees.

Currently, the dimensions of lug boxes for the fruit and vegetable industry are approximately 16 inches wide by 24 inches long, and 8 or 9 inches high, these dimensions still being resorted to, although the reasons therefor no longer exist. Historically, lug boxes of this type were handled manually and by the aid of hand trucks. Boxes of 16-inch width were found convenient for they could be readily broken over when stacked vertically on a hand truck or on the floor. Their 24-inch length, when placed transversely to the line of direction of the hand trucks and motor trucks resulted in greater stability to the boxes when being transported.

Presently, however, these lug boxes are handled by fork lift trucks in palletized unit loads of two boxes by three boxes, and as so handled, a narrow box having the historical width of 16 inches is actually disadvantageous. Preferably, the boxes should be in stable equilibrium when being transported by a carrier on the road as well as when being toted on a fork lift truck. To most effectively tie a load of boxes to a truck or other carrier, they should be so disposed that their lengths are transverse to the bed of the truck or carrier. Here it should be noted that the boxes are supported on 4 x 4 foot pallets (approximate dimensions) disposed on the bed of the truck. When the carrier arrives at its destination the palletized unit loads are removed by a fork lift truck operating from the sides thereof. This means that the boxes are supported by the lift truck with their length parallel to the forks of the lift truck, in other words, parallel with the line of travel of the truck. As a result of this, the boxes can tumble more readily laterally from the fork lift truck than if they had been supported thereon with their lengths transverse to the line of travel. Consequently, although an advantage has been gained by stacking the boxes on the carrier with their lengths transverse to the line of travel, a corresponding disadvantage occurs when they have been transferred to the lift truck.

Either because of custom or law, the maximum width of a truck and/or its load for over-the-road hauls is 8 feet, and this, coupled with the fact that the truck must be unloaded from its side, dictates that the boxes must

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be uniformly disposed on the truck with reference to the center line thereof. If a 2-foot long box is used, two palletized unit loads may be placed side by side across the width of the truck.

More specifically, one of the objects of this invention is the provision of a combination of two or more identical generally square and vertically tapered boxes, each provided with dissimilarly contoured adjacent side walls or corners whereby two such boxes can be nested by placing their similar sides or corners in vertical registration with each other or stacked by placing their dissimilar sides in vertical registration with each other.

A further object of this invention is the provision of a box of the character above described provided with an outwardly overturned upper peripheral edge serving as a ledge or handhold for manually handling the box or as a ledge or shoulder by which the box can be supported by the forks of a lift truck or other mechanism.

Still another object of this invention is the provision of a box of the character above described provided with either a recessed upper peripheral ledge or with a stepped bottom so that when two such boxes are stacked, portions thereof are slightly nested, thereby to key them against relative lateral movement.

Still another object of this invention is the provision of tapered boxes capable of being stacked, nested, and interlocked and which when placed side by side form intermediate inverted V-shaped channels, capable of receiving the fork of a lift truck.

A still further object of this invention is the provision of the combination of a plurality of laterally interlocked and tapered lug boxes and a lift truck provided with forks arranged to be disposed between the outside walls of a pair of two or more laterally disposed boxes and within the wedge shaped interior openings formed by the intermediate side walls of said boxes.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawings accompanying and forming a part of the present specification, is outlined in full. In said drawings, one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims may be embodied in other forms.

Referring to the drawings:

Fig. 1 is a top plan view of a lug box embodying the objects of my invention.

Fig. 2 is an enlarged fragmentary plan view of the right hand side of the box shown in Fig. 1.

Fig. 3 is a fragmentary vertical section taken through a pair of stacked boxes embodying the objects of my invention.

Fig. 4 is a side plan view showing a truck supporting a plurality of stacked and interlocked boxes and a lift truck provided with forks operatively associated with said boxes.

Fig. 5 is a vertical section taken on the section line 5—5 of Fig. 4.

Fig. 6 is a top plan view of a modification of the box shown in Fig. 1.

Figs. 7, 8, and 9 diagrammatically illustrate various and further contours which can be given to the side walls of my box to produce a nesting and stacking arrangement.

As best shown in Figs. 1, 2, and 3, some of the objects of my invention have been embodied in a square lug box generally designated by the reference numeral 1, and preferably about 2 feet by 2 feet in lateral dimensions and approximately 8 or 9 inches deep. Advantageously, a box of this kind can be made of aluminum or plastic, and if made of aluminum should weigh in the neighbor-

hood of five pounds. A box so loaded with fruit, such as pears, should then weigh in the neighborhood of 75 pounds, this being a load capable of being manually handled by an operator.

Formed on each side of the box 1 is a plurality of symmetrically disposed, alternately convex and concave corrugations or flutes 2 and 2a, each of the concave flutes 2a terminating substantially short of the bottom 3 of the box in an inwardly extending step or shoulder 4. From an inspection of Fig. 1 it should be noted that both pairs of diagonally disposed corners of the box are symmetrical, whereas each adjacent pair of corners are asymmetrical. More specifically, it will be noted that the diagonally opposed pairs of corners 5 and 6, and 7 and 8, of the box are identical, whereas the adjacent pairs of corners 5 and 7, and 6 and 8 are asymmetrical.

Circumscribing the flutes 2, and forming the upper end of the box, is an outwardly turned, substantially horizontal, flat, peripheral lip 9 formed with a downwardly turned portion 10, provided with inwardly extending handhold recess 11 and with a return bend 12, the return portion 12 serving as a stop or shoulder for supporting one box on top of the corresponding peripheral portion of an overlying box nesting therein and preventing two nested boxes from becoming wedged together. Formed along the lip 9 of each box outwardly of each of the convex corrugations or flutes 2, is a downwardly extending arcuate recess 13 for receiving the lower concave end of a flute 2a of a box stacked thereon. As is readily apparent from Fig. 3, this structure serves to slightly nest two stacked boxes and thereby lock or key them against relative horizontal translatory movement in all directions.

Here it should be noted that the contour of the corner of each pair of diagonally opposed corners of the box is identical; that the contours of adjacent corners are dissimilar or asymmetrical; and that the location of the center line of the terminal concave flute on one side of the box (corner 5) substantially corresponds to the location of the terminal convex flute of the adjacent side of the box (corner 7 or 8). For example, the distance a at corner 5 equals the distance a at the corner 8. This insures that when one such box is placed over another identical box with their dissimilar sides in vertical registration, portions of the bottom of the upper box will overlie portions of the top of the lower box, whereby the upper box can be supported or stacked on the lower box.

To nest a combination of two boxes so stacked, the upper box is simply rotated through 90 degrees so as to bring the identical sides of the boxes into vertical registration with each other. In this respect, the present box differs from the box disclosed in my copending application wherein two stacked or nested boxes must be rotated through 90 degrees relative to each other in order to bring them respectively into their nested or stacked positions. The fact that two or more boxes can be changed from their stacked position to their nested position by simply rotating any pair of boxes through 90 degrees is of considerable advantage, for an operator can rotate the boxes through this angle by simply rotating his body through this angle, whereas a rotation of a box through 180 degrees would require the operator to first rotate the box through 90 degrees and then reverse his grip on the box and rotate it through an additional 90 degrees.

Since the length of the box is preferably equal to its width and both dimensions are equal to the length of lug boxes formerly used, the boxes have the same stability when placed transversely or longitudinally of the direction of travel of a carrier or a lift truck. Still another advantage of this box is that by making it two feet long on each side, its capacity over current boxes is increased by one-third, thereby reducing the number of boxes required to carry out a given operation. Furthermore, such boxes can be made into stable two-by-two unit pallet loads for transportation by trucks or handling by lift

trucks without reference to the length or width of the boxes as is presently required.

As shown in Figs. 4 and 5, when boxes of this character are stacked either on the floor or on the bed of a truck 21 or other carrier, the adjacent boxes form downwardly diverging channels 14, thus making it possible to lift a stack of boxes two boxes square by the use of a lift truck 22 having a central wedge-shaped tine 15 and two side tines 16 and 17 each formed with a sloping inner wall 18 conforming to the taper of each adjacent box. Preferably, the depth of the tines 15, 16, and 17 should be substantially less than the depth of the box so that there will be sufficient clearance to enable the tines to be moved vertically to their operative position and then elevated slightly, whereupon the boxes will be supported and wedged between each adjacent pair of tines. Here it should be noted that by resorting to this structure the use of pallets or the equivalent thereof has been eliminated.

The modification of the box illustrated in Fig. 6 is similar to the box shown in Fig. 1, except as to the sequence of its convex flutes 32 and concave flutes 32a. Here it will be noted that by traversing the box clockwise and starting with the lower left-hand corner of the box, the initial flute is a convex flute 32. As in the modification illustrated, the flutes as they progress clockwise are alternately convex and concave, the last flute on the left-hand side of the box being concave. The upper side of the box likewise starts at its left-hand corner with a convex flute 32 and terminates at its right-hand side with a concave flute 32a. Going downwardly along the right-hand side of the box, the first flute is a concave flute 32a and the last flute is a convex flute. The first flute of the lower side of the box beginning at the right-hand end thereof is a concave flute 32a, whereas the left-hand flute of this side of the box is a convex flute 32. As a result of this sequence of convex and concave flutes, it will be seen that two identical boxes can be nested if both are in vertical registration and in the position shown in Fig. 6. If then the top box be lifted sufficiently to clear the lower box and rotated through 90 degrees it will be seen that the left and right-hand sides of the boxes will be in the stacking position, whereas the two remaining and opposed sides of the box will be in their nesting position. A further rotation of the top box through another 90 degrees (total of 180 degrees) will bring all of the sides of the top box into stacking relationship with the lower box. In the third position of the boxes, two opposed sides of one box will be in their nesting position with respect to the other box, whereas the remaining two opposed sides thereof will be in their stacking relationship with respect to the other box. Although in this modification it is only necessary to rotate one box through 90 degrees with respect to another identical box in order to shift from the nesting position to the stacking position, depending on the initial position of the boxes, it may be necessary to rotate one box through an angle of 180 degrees with respect to the other box in order to bring all of its sides into either nesting or stacking relationship with respect to the other box.

Fig. 7 diagrammatically illustrates a square tapered box generally designated by the reference numeral 31, and wherein the major length of each of its four sides 32, 33, 34, and 35 is straight. Two of the diagonally opposed corners 36 and 37 of the box are identically stepped, contoured as at 38 and 39, whereas the remaining two diagonally opposed corners 41 and 42 are diagonally contoured by diagonal sides or faces 43 and 44.

Here it is to be noted that each side of each pair of opposed sides of the box can be considered as identically contoured, but in reverse order. A combination of two such boxes can therefore be stacked as well as nested, and when stacked, the upper box will be supported by each of the four corners of the lower box. If desired, non-stacking, reinforcing flutes or corrugations can be

formed along the straight portions of each side of the box. Such non-stacking flutes or contours must, of course, be symmetrically disposed on all four sides of the box to permit two boxes to nest and would be used for reinforcing purposes.

In the modification of my box diagrammatically illustrated in Fig. 8, the tapered side walls 51, 52, 53, and 54 are identically contoured and include vertically inclined end portion 56. Here it is to be noted that the opposed corners of the box are identical, the adjacent corners are asymmetrical, and that in going around the box clockwise and starting at the top side thereof the position of the flutes 55 alternate between the trailing and leading end of each side. Here again, two such boxes can be either nested or stacked.

In Fig. 9 still another contour pattern is illustrated. Here the opposed corners 61 and 62 are identical and likewise the opposed corners 63 and 64 are identical, whereas each adjacent pair of corners such as for example the corners 61 and 62 are asymmetrical. Viewed in another way, it can be stated that the sides of each pair of adjacent sides of the box are dissimilarly contoured. As in each of the modifications previously described, all portions of the sides of the box are inclined, although the flutes or contours thereof are reversely inclined.

From these various modifications it will be seen that although a combination of two identical and perfectly symmetrical, tapered boxes can always be nested, they cannot be stacked unless some dissimilarity exists in their contours. Such dissimilarity can occur either at the corners of the box or intermediate said corners.

As previously mentioned, one additional requirement must be observed: the taper of the box, its height and the offset of the contours of its sides must be so related that when two identical boxes are stacked, portions of the bottom of the upper box must of necessity overlie portions of the top of the lower box, for otherwise the two boxes would nest to a certain degree. If the side walls of the box have a fluted or corrugated contour the flutes may be arcuate in cross-section or polygonal in cross-section, and the dissimilar contours should preferably occur in a repetitive and alternating pattern so that, for example, in the case of a pair of square boxes, the two boxes can be alternately made to nest and stack by turning the upper box through 90-degree increments.

When such boxes are loaded and stacked, they form a column, and it is of course the lowermost box that takes the greatest load. If two opposed sides of the box are sufficiently strong to support the load imposed upon it, it is immaterial insofar as the load factor is concerned which modification of box is used. However, the first modification is preferred because insofar as stacking is concerned, and other factors such as gauge of metal being equal, it provides a greater column strength, and is just as easy and economical to manufacture and maintain.

If a box of this character becomes dented as a result of use, it can if made of aluminum or other ductile metal, be brought back to its original configuration by the use of suitable dies.

I claim:

1. A symmetrically tapered polygonal nesting and stacking lug box including a plurality of side walls of equal length and depth, each of said walls being pro-

vided with a series of alternate, downwardly extending convex and concave flutes, the first flute of some of said sides counted in clockwise direction being of convex form whereas the first flute of another of said sides counted in the same direction being of concave form, and said flutes being so arranged that all of the flutes of two of said boxes can be brought into vertical registration and mated so as to nest said boxes and so that upon the rotation of one of said boxes the flutes on at least two opposed sides thereof will be out of registration with some of the vertically aligned flutes of the other box thereby to place said boxes in stacking relation with each other.

2. A square symmetrically tapered nesting and stacking lug box including two pairs of opposed side walls each provided with a series of alternate, downwardly extending convex and concave flutes, the first flute of two of said series of flutes counting in clockwise direction being of concave form, and the first flute of the two remaining series of flutes counting in the same direction being of convex form, said flutes being so arranged that all of the flutes of two of said boxes can be brought into vertical registration and mated to nest said boxes and by rotating one of said boxes through 90° the flutes of two opposed sides thereof will be out of registration with the flutes of the vertically aligned flutes of the other box thereby to place said boxes in stacking relation with each other.

3. A square nesting and stacking lug box including two pairs of opposed, symmetrically tapered side walls each provided with a series of alternate, downwardly extending, convex and concave flutes, the two corner flutes of two of the diametrically opposed corners of said box being concave and the two corner flutes of the two remaining diametrically opposed corners of said box being convex.

4. A box such as defined in claim 3, wherein the lower ends of said concave flutes as viewed from the interior of the box terminate substantially above the bottom of said box and are closed.

5. A square tapered nesting and stacking box including two opposed pairs of contoured side walls defining two pairs of diagonally opposed corners, the contours of any two walls starting from their common corner being identically contoured, and the contours of each of such walls being asymmetrically arranged relative to its two terminal corners, said contours extending substantially the full depth of said box.

6. A box such as defined in claim 5 provided along its upper peripheral edge with an outwardly extending, over-turned ledge.

7. A box such as defined in claim 5 wherein said ledge is formed with a handhold recess.

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