No. 782,544. PATENTED FEB. 14, 1905.

R. J. CARRIER.

TRAY.

APPLICATION FILED DEC. 21, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

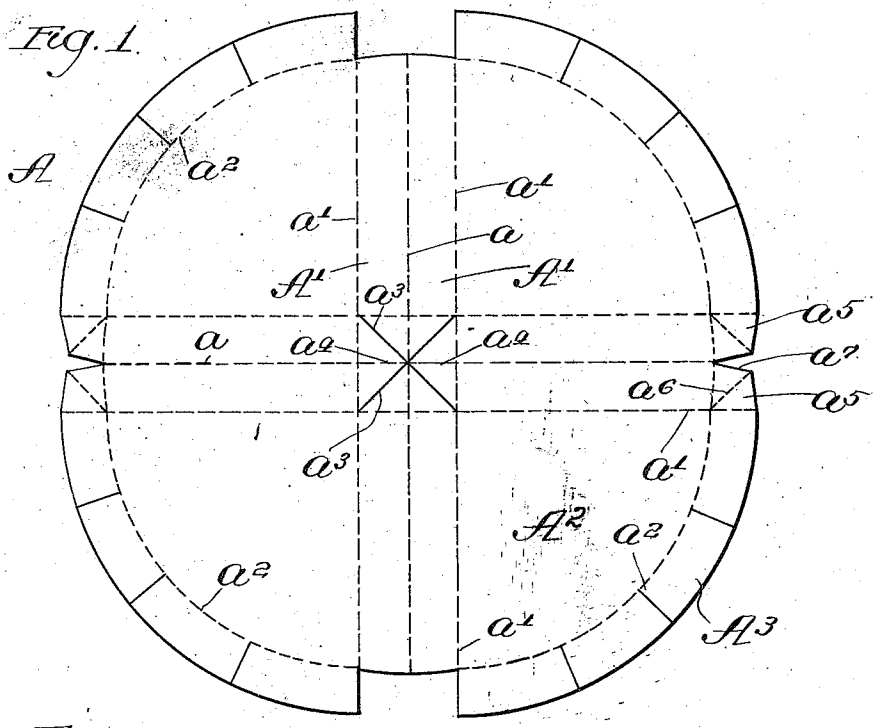


Fig. 2.

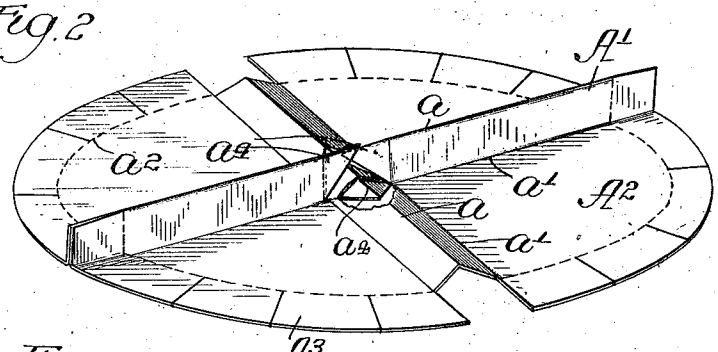
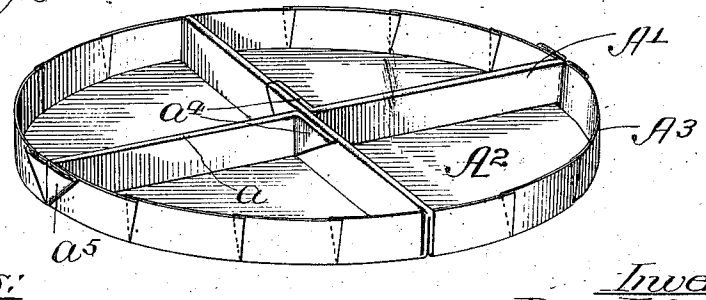


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4

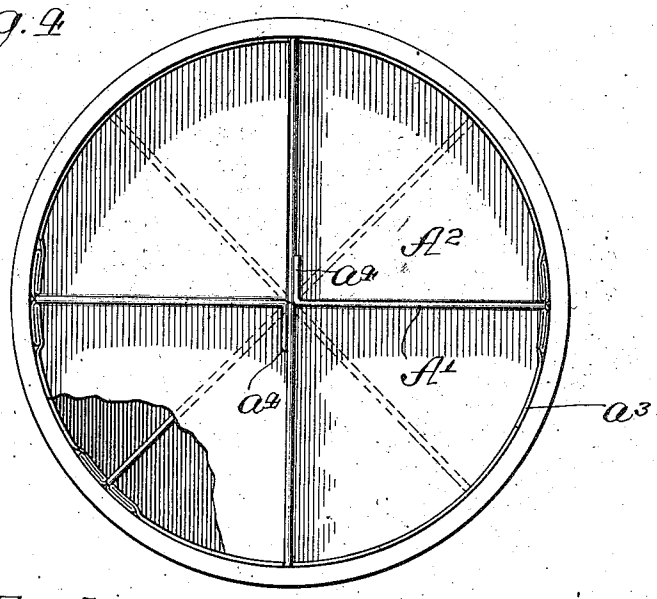


Fig. 5

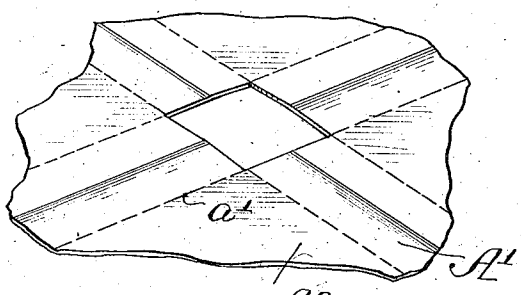


Fig. 6

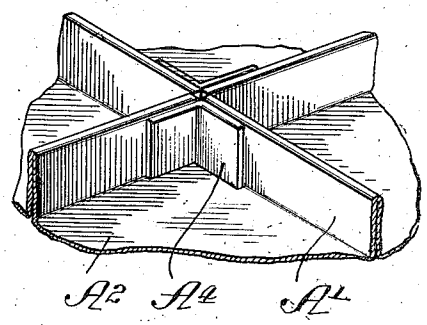


Fig. 7

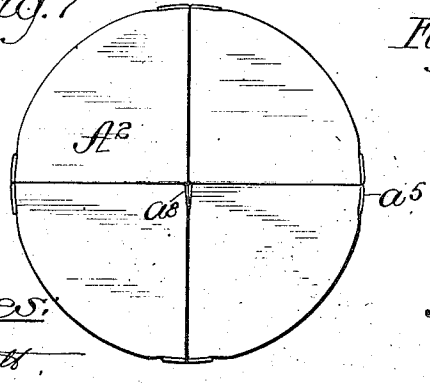
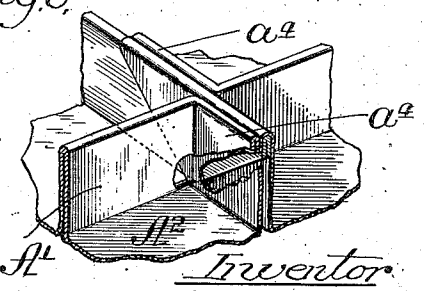


Fig. 8.



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UNITED STATES PATENT OFFICE.

ROY J. CARRIER, OF HINSDALE, ILLINOIS.

TRAY.

SPECIFICATION forming part of Letters Patent No. 782,544, dated February 14, 1905.

Application filed December 21, 1903. Serial No. 185,960.

To all whom it may concern:

Be it known that I, ROY J. CARRIER, a citizen of the United States, and a resident of the village of Hinsdale, in the county of Dupage and State of Illinois, have invented certain new and useful Improvements in Trays; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in trays made of paper or other flexible sheet material and provided with a flat bottom wall and usually with a surrounding or circumferential rim of wall.

The device herein illustrated is especially applicable for use as trays in packing merchandise in pails or other receptacles, and when used in this manner the trays are placed in the receptacle one over the other and may be filled either before or after they are placed in the receptacle, the trays thus serving as horizontal separators or partitions by which the layers of material contained in the trays are separately supported.

The tray herein shown as embodying my invention is made of a single piece of sheet material and comprises a flat bottom wall, preferably surrounded by a circumferential rim formed by turning upwardly the margin of said wall, and a plurality of radial partitions extending from the outer marginal part to the center of the tray and made integral with the material constituting the bottom wall of the tray, said partitions being formed by folding parts of the material of said bottom wall upwardly along radial lines. So far as is concerned the formation of the radial partitions the circumferential wall may be varied in its form and may in some instances be omitted. A device embodying the same features of construction may, however, be used for other purposes, as will hereinafter more fully appear.

This invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of a blank from which my improved tray is made, showing the same after it has been cut and scored preparatory to folding. Fig. 2 illustrates said blank after the same has been partially folded to form the radial partitions on the upper face of the bottom wall of the tray. Fig. 3 is a perspective view of a completed tray. Fig. 4 is a top plan view of a pail, showing the manner of arranging my improved trays therein. Figs. 5 and 6 are fragmentary perspective views of the central part of a modified form of the device. Fig. 7 is a bottom of the folded blank shown in Fig. 3 drawn in a reduced or smaller scale. Fig. 8 is a perspective view, partially in section, of the radial overlapping or telescoping partitions when folded.

As shown in said drawings, A, Fig. 1, indicates a blank in flat form from which my improved tray is made. Said blank is of a contour approximating a circle, as herein shown, but will of course be varied to correspond with different-shaped trays, and is provided with two sets of score-lines a and a', three parallel lines in each set, the lines of each set extending across the blank in one direction and intersecting the lines of the other set at the center of the blank. Between the central score-lines a of each set and the side score-lines a' thereof are formed two parallel strips or sections A' A', the parts of which on each side of the center of the blank are adapted to be folded upwardly about the side score-lines a' from the main body A^2 of the blank (which latter constitutes the bottom wall of the completed tray) to constitute double-thickness radial partitions extending from the center to the circumference of the complete tray. a^2 a^2 designate curved score-lines which are parallel with the outer margin of the blank and intersect at their ends the outer radial score-line a'. The curved strips or sections A^3, lying outside of said curved score-lines a^2, are adapted to constitute the circumferential rim of the tray and are folded upwardly about the curved score-lines a^2 from the bottom wall A^2, as more clearly seen in Fig. 3. Said curved sections or strips A^3 are radially slitted in order to facilitate the folding of the same upwardly, and the adjacent ends of the slitted portions overlap each other when they assume their

finished form, as clearly shown in full and dotted lines in Fig. 3. At the intersection of the two sets of parallel score-lines a' at the center of the blank is formed a rectangular-shaped part or section which is divided by two diagonal intersecting lines of incision a^3 into four triangular sections a^4, the free points of which triangular sections meet at the center of the blank, and the base portion of each of which is joined to the inner end of one of the radial sections composed of two adjacent strips A′, located between adjacent score-lines a' at one side of the center of said blank. The triangular-shaped parts a^4 are bisected by the inner ends of the central radial score-lines a. The said blank is cut and scored in the manner described and shown in Fig. 1 in a single operation of a suitable die or form. The devices for forming the score-lines are so constructed and operate in such manner as to give the parts a tendency to fold along said score-lines.

When a tray is set up or formed from a blank cut and scored in the manner shown in Fig. 1, the parts or sections at each side of the center of said blank between the radial score-lines a' are folded upwardly from the bottom wall A^2 about the said score-lines a' until the sections or parts A′ assume vertical positions and are brought flatwise together in vertical contact, thereby constituting partitions of double thickness. When the parts are thus folded, the adjacent margins of adjoining sections A′ are folded along the central score-lines a, the parts traversed by said score-lines constituting the highest parts of the partitions. Such folding operation is affected by grasping the blank on two opposite sides of the center thereof and at each side of the parts or sections A′ contained between the score-lines a' and pressing the same together in a manner to shorten the diameter of the blank in one direction, and such pressure causes the radial sections A′ to rise and be folded upwardly from the bottom wall A^2 and to be pressed together in the manner described, thereby forming two oppositely-extending partitions extending across the blank in one direction. As the sections A′ are thus folded upwardly to constitute said oppositely-extending partitions, the triangular parts a^4 at the inner ends thereof are also folded flatwise together along the central bisecting score-lines a, as clearly shown in Fig. 2. The position of the parts when the folded operation has proceeded thus far is shown in Fig. 2. At the time the said two oppositely-extending partitions are being formed in the manner described and the diameter of the blank is being thereby shortened in a direction at right angles to the direction of the forming-partitions the triangular-shaped parts a^4, belonging to the inner ends of the partition-sections which extend in the direction of the shortened diameter of the blank, are caused to lap one over the other, the inner pointed end of one of said sections being raised above the other and caused to slide over said other section during the time that the diameter of the blank is being thus shortened, as clearly indicated by the full and dotted lines in Fig. 2. After two oppositely-extending partitions have been thus folded and the triangular projections of the other partition-sections have been made to overlap, as described, the said other partition-sections may be folded flatwise against each other by pressing the hands together while still engaged with the blank, and thereby shortening the diameter of the blank in the other direction. Before the last-mentioned partition sections are folded upwardly the triangular parts a^4, belonging to the sections first folded, are turned sidewise by the finger or thumb, so as not to interfere with the rising of the parts a^4 belonging to the sections last folded. It will be understood that the manner of folding the partitions upwardly from the end wall of the tray need not necessarily take place in the sequence described, but that the folding of all the partitions may take place practically simultaneously by properly applied pressure which will shift the four triangular parts of the blank lying within the angles between the two sets of score-lines toward the center of the blank, as it is obvious that this is what occurs whether it be sequentially or simultaneously accomplished. The sequential order of folding the partitions has been described, however, in order to render more clear the essential movements of the parts when being folded. The triangular sections a^4 at the ends of the partition-sections A′, which ride one over the other, as shown in full and dotted lines in Fig. 2, are folded only along the central score-lines a thereof in the direction of the length of said partition, but the like triangular sections a^4 of the other partition are not only so folded, but are again folded along the score-lines a' at right angles to the partition-sections to which they belong and lie flat against said overlapping partitions. Said right-angle folded sections a^4 may, if desired, be joined to the partitions against which they lie by an adhesive material or otherwise, but this will ordinarily not be necessary for the reason that when the trays are set and properly fitted in a receptacle the engagement of the circumferential rim of the tray with the receptacle-walls acts to hold the partitions in their proper relation with respect to each other. It will be observed that by reason of the overlapping of the adjacent ends of two of the radial partitions the two overlapping partitions constitute, in effect, when the tray is set up a straight continuous partition extending entirely across the tray. It will be further observed that such overlapping partitions are laterally supported at both sides by the other partitions which abut against the overlapping parts of said partitions in

alinement with each other and at right angles to such overlapping partitions, and such lateral support is sufficient to hold the overlapping partitions upright without the necessity of attaching the outer ends of the overlapping partition to the annular rim of the tray.

If desired, the central triangular sections a^4 at the center of the blank may be omitted, as indicated in Fig. 5, in which event the adjacent ends of the partitions formed by the sections A′ may be fastened together by means of angle-pieces A^4, set in the angles between adjacent partitions.

The partition-sections A′ may be secured in any suitable manner at their outer ends to the circumferential wall or rim A^3 of the set-up tray. In the ordinary use of these trays in a receptacle wherein the surrounding rim is confined by engagement with the inner wall of the receptacle I find that such interlocking connections of the partitions, which overlap each other at their inner ends and constitute, in effect, a continuous partition extending entirely across the tray, as before stated, with the rim are not in all cases required, as the other partitions abutting against the opposite sides of the said overlapping partitions afford sufficient rigidity as to hold the latter partitions in place and upright. In the case of the partitions, the inner triangular sections a^4 of which are bent at right angles to lie against the overlapping partitions, it is desirable to provide means for interlocking the outer ends thereof with the circumferential rim. Such interlocking connection is provided in the present instance by continuing the sections A′ outwardly past the score-lines a^2, which define the margin of the tray when it is set up, to constitute polygonal sections a^5, which are defined at their inner margins by continuations of the curved score-lines a^2 and on their opposite lateral margins by continuations of the outside radial score-lines a', and said polygonal sections are bisected by oblique score-lines a^6, which divide each of the sections into two triangular parts. The adjacent margins of said polygonal sections A^5 and the outer margins thereof, which constitute parts of the circumferential margins of the blank, are cut away, as indicated at a^7, so as to prevent parts thereof from projecting above the wall or partition when the parts are set up. After the partitions have been formed up in the manner hereinbefore described and while the curved sections A^3 are being folded upwardly to constitute the rim of the tray said polygonal sections a^5 are folded along the oblique lines a^6 to constitute folded triangular sections, which latter may be folded either outside or inside of the annular rim, said sections being shown in Fig. 3 as folded outside the rim. In this manner an interlocking connection is afforded between the ends of said partitions and the annular rim of the tray. As before stated, I have found it unnecessary to so reinforce the outer ends of the partitions which overlap each other at the center of the tray, and in this instance the partition-sections A′ are terminated in line with the curved score-lines a^2. If desired, however, the ends of the overlapping-partition sections may also be interlocked with the annular rim of the tray. Obviously other means may be employed for interlocking the partition-walls with the rim—as, for instance, said partitions may be interlocked with the rim by means of angle-pieces such as is shown in Fig. 6.

From the foregoing it is apparent that the diameter of the blank is shortened in both directions to constitute the final diameter of the tray and that such shortening of the diameter is accomplished by shifting the four triangular parts of the blank toward the center thereof, such shifting being made possible by reason of the cutting of the blank at the center either to form the triangular parts a^4, as shown in Figs. 1, 2, and 3, or by cutting the central portion of the blank entirely away, as shown in Figs. 5 and 6. It will furthermore be observed that in forming the blank the curvature of the score-lines a^2, which define the margin of the set-up tray, is formed from a center which is located at the intersection of the radial score-lines a' and that said score-lines in the blank are not parts of the same circle. In this manner when the triangular sections of the blank are shifted inwardly to form up the partitions in the manner described the center points of the several curved score-lines a^2 are made to approximately coincide, so that the margins of the tray defined by said curved score-lines a^2 closely approximate a circle. If the blank be originally made of circular form, the score-lines a^2 would not be concentric with the center of the completed or formed-up tray, and such tray would not therefore fill the complete circle of a pail or like receptacle. When making a tray of other than circular form, the contour of the blank will be correspondingly modified.

When the trays are used in tapered pails, they are made in sets of graduated diameters to correspond with the gradually-increasing diameter of the pail. In placing the trays in a receptacle the first tray is placed upon the bottom of the receptacle, the second upon the upper margin of the first tray, the third occupying a similar position with respect to the second tray, and so on until the receptacle is filled, and the number of trays in a set depends upon the depth of the individual trays. In arranging the trays in the receptacle in the manner described it is an advantage to arrange the partitions of adjacent trays at an angle with respect to each other, (indicated in full and dotted lines in Fig. 4,) wherein it is seen that the partitions of the tray shown in full lines are located substantially midway be-

tween the partitions of the subjacent tray. In this manner the bottom wall of each tray between the partitions thereof is supported by the partitions of the subjacent trays. It will also be noted that the center of the trays, which are reinforced by the connection of the inner ends of the partitions, are located one over the other, thereby constituting, in effect, at the center of the receptacle a continuous column extending from the top to the bottom of the assembled trays, which adds greatly to the strength of the assembled tray structure.

By reason of the provision of the partitions extending radially from the center to the circumference of the tray the tray is greatly strengthened, and I am therefore enabled to make trays of a given strength of a much lighter stock than if the partitions were omitted. The manner in which the partitions are formed is of great importance, as they add but little to the expense of producing the tray, the additional cost being only represented by the actual cost of the stock, no additional expense for labor being required to attach the partitions or form them on the trays. An advantage of forming the partitions in the tray end wall in the manner shown is that this construction not only gives great vertical and lateral rigidity to the tray, but when the trays are filled and the receptacle containing the same is tipped or tilted the lateral weight of the tray contents does not act as a unit against any part of the tray or trays or against the individual articles of the said contents; but such weight is divided into as many parts as there are separate compartments of the tray due to the presence of the partitions, so that the contents of the tray is not so likely to become crushed in the tray. When the trays are used to contain soft merchandise, as chocolate or iced confections, the trays will be made of a depth to correspond with the depth of a single layer of the merchandise, so that notwithstanding tilting or tipping of the receptacle the articles of the several layers will not shift out of position and be crushed. Another important advantage of the construction described is that the trays are capable of being shipped and stored in flat or knockdown form, so that but little storage or transportation space is required for a large number of trays. Furthermore, in this manner I am enabled to economize not only the storage and transportation space required for such trays, but am also enabled to save greatly the cost of freight transportation, inasmuch as the flat or knockdown form of the device takes a much lower freight rate than set-up trays.

While the tray is shown as divided into four compartments by four partitions, it may be divided into a less or greater number of compartments.

It will be observed by reference to the bottom view in Fig. 7 that the inner surfaces of the adjacent radial partitions when the blank is folded lie close to and touch each other excepting only where the small section a^4 of one of the partitions is telescoped or lapped under the diagonally-opposite partition, as shown at a^8. All of the partitions A′ are formed simultaneously by folding the blank along the scored lines a, and this act of folding brings each sector-shaped section closer together, as the two sets of radial scored lines intersect. One set of two triangular-shaped parts a^4, those radially opposite each other, overlap or telescope, while the other two are folded, preferably, in opposite directions, as shown in Fig. 3, and lie or abut against the respective partitions. This makes a very strong and durable partition well adapted to withstand torsional as well as radial strain.

I claim as my invention—

1. A tray provided with a bottom wall and a plurality of radial partitions, each formed by folding upwardly from said bottom wall into vertical contact two parallel, radial partition-sections which are separated from each other by score-lines and from the flat bottom wall by other score-lines, and means for connecting the inner ends of the partitions in a manner to support vertically certain of the partitions.

2. A tray made of a single piece of sheet material comprising a bottom wall and a plurality of radial partitions, made integral with and folded upwardly from said bottom wall, certain of the partitions supporting others at the inner ends thereof.

3. A tray comprising a bottom wall, a surrounding rim and a plurality of radial partitions which are integral with and folded upwardly from the bottom wall, said partitions having interlocking connection with each other at their inner ends and interlocking connections between the outer ends of said partitions and said rim.

4. A tray made of a single piece of sheet material comprising a bottom wall surrounded by a rim and a plurality of radial partitions made integral with and folded upwardly from the bottom wall of the tray, and connected to the rim and with each other in a manner to maintain the same vertical.

5. A tray made of a single piece of sheet material comprising a bottom wall and a plurality of double-thickness radial partitions made integral with and folded upwardly from the bottom wall of the tray, and means for connecting the inner ends of the partitions in a manner to support certain of the partitions from the others.

6. A tray made from a single piece of sheet material comprising a bottom wall, a rim folded upwardly from and surrounding said bottom wall, a plurality of radial partitions folded upwardly from said bottom wall and means for interlocking the outer ends of said partitions to said rim.

7. A tray of sheet material comprising a

bottom wall, and a plurality of radial partitions folded upwardly from said bottom wall, two of the partitions which extend in one direction having overlapping engagement at their inner ends and the other partitions abutting against the opposite sides of the overlapping partitions.

8. A sheet-material tray provided with a plurality of double-thickness radial partitions which meet at the center of the tray and are folded upwardly from the bottom wall thereof, two of the partitions which extend in the same direction having telescopic engagement at their inner ends and the other partitions abutting against the opposite sides of the telescopic parts of the first-mentioned partitions.

9. A tray made of sheet material comprising a bottom wall, and a plurality of radial partitions, two of said partitions which extend in the same direction being provided at their inner ends with parts which have overlapping engagement and the other partitions being provided at their inner ends with folded parts which lie against the opposite sides of the overlapping parts of the first-mentioned partitions.

10. A tray made of sheet material comprising a bottom wall, a rim surrounding said wall, and a plurality of radial partitions extending inwardly from said rim, and formed by being folded upwardly from said bottom wall, two of the partitions which extend in one direction having overlapping engagement at their inner ends, and the other partitions abutting against the opposite sides of the overlapping partitions, the two last-mentioned partitions having connection at their outer ends with the rim.

11. A tray made of sheet material comprising a bottom wall, a rim surrounding said bottom wall, a plurality of radial partitions folded upwardly from said bottom wall, certain of the partitions being joined to said rim by an interfolding connection.

12. A tray made from a single piece of sheet material comprising a bottom wall, a rim surrounding said wall, and a plurality of radial partitions folded upwardly from said bottom wall, certain of the partitions being provided at their outer ends with parts which are integral with said rim, and which are folded to lie flat against one of the integral parts, to wit, the partition or rim.

13. In a tray, the combination with a bottom wall, a rim which is folded upwardly therefrom and a part which is also folded upwardly from the bottom wall at an angle to the rim, of a section in the angle between the two upwardly-folded parts, said section being diagonally divided by a score-line upon which the section folds when the tray is set up, and the two parts of said section being adapted to be folded flatwise against one of the integral parts.

14. A blank of generally circular form for a tray which is divided into sector-shaped parts by a plurality of sets of score-lines which intersect at the center of the blank, each set comprising three parallel score-lines, and each sector-shaped part being provided with a curved score-line which is inside of and parallel with the arc-line or outer curved margin of said sector-shaped part.

15. A blank for a tray divided into a plurality of symmetrically-arranged parts by a plurality of sets of score-lines which intersect centrally of the blank, each set comprising three parallel score-lines and the parts in the angle between the intersecting sets of score-lines being provided inside their outer margins with score-lines forming between the same and said outer margins a rim-section.

16. A blank for a tray which is divided into sector-shaped parts by a plurality of sets of score-lines, each set comprising three parallel score-lines, the central part of the blank bounded by the outer score-lines of the sets being cut to permit the sector-shaped parts to shift radially inwardly.

17. A blank for a tray which is divided into symmetrically-disposed parts by a plurality of sets of score-lines intersecting centrally of the blank, each set comprising three score-lines forming between the same partition-sections which are adapted to be folded upwardly from the blank in flatwise engagement, and the part of the blank at the intersection of said score-lines being cut to provide sections which constitute continuations of the partition-sections.

18. A blank for a tray provided with a plurality of intersecting sets of score-lines a a', the curved score-lines a^2 and the diagonal slits or cuts a^3 extending diagonally across the part of the blank bounded by the outer ones of the intersecting score-lines and forming the triangular parts a^4.

19. In a blank for a tray, the sheet provided with a plurality of intersecting sets of score-lines a a' forming between the lines of each set the parallel partition-sections, the score-lines a^2 between which and the margin of the blank is formed a rim-section, and the sections a^5 in the rim-section and at the ends of the partition-sections, which are divided by the oblique score-lines a^6.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 15th day of December, A. D. 1903.

ROY J. CARRIER.

Witnesses:

TAYLOR E. BROWN,

GERTRUDE. BRYCE.