

Oct. 25, 1938.

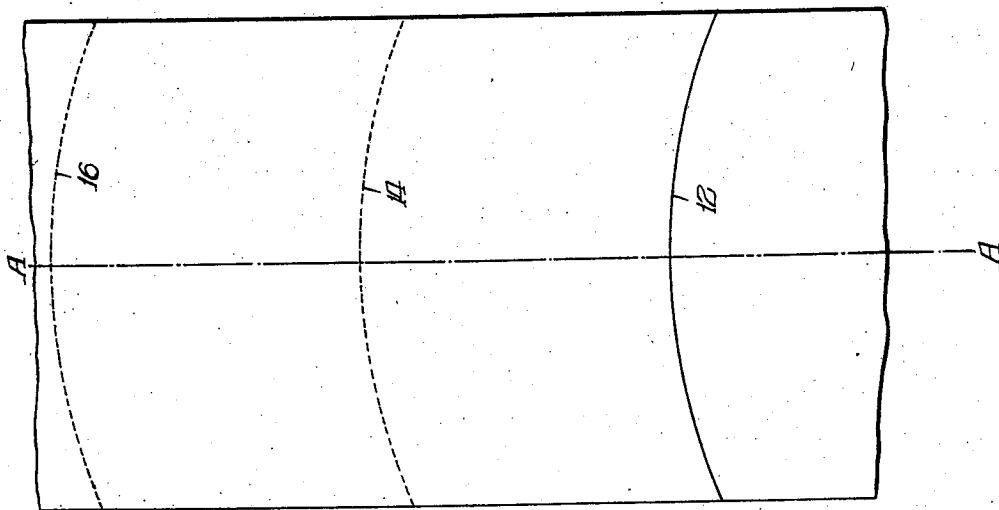
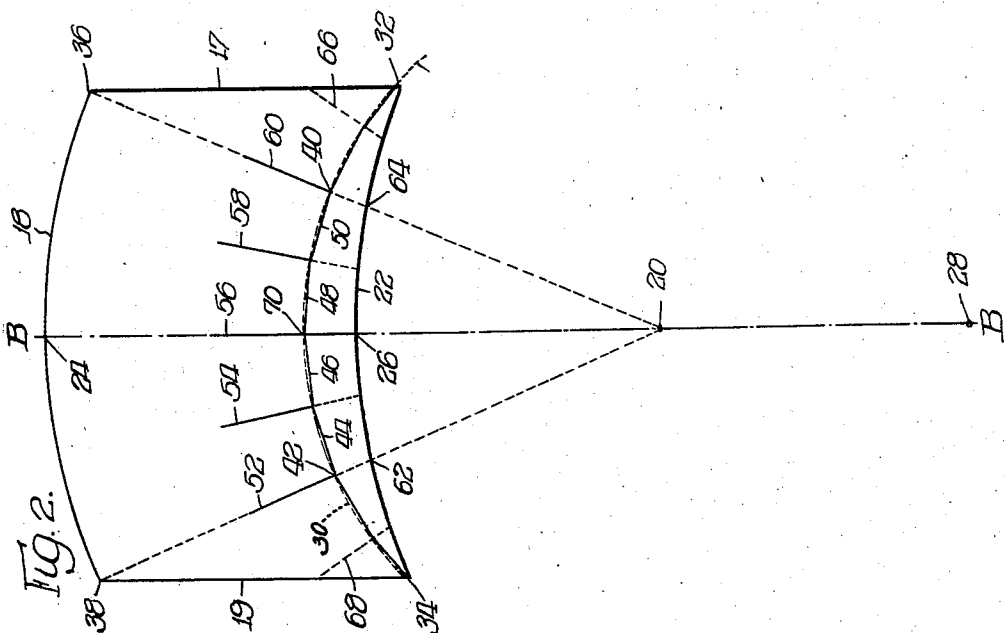
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2,134,321

RECEPTACLE

Filed Dec. 28, 1936

3 Sheets-Sheet 1



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Fig. 7

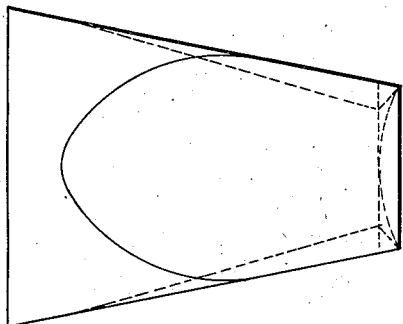


Fig. 8

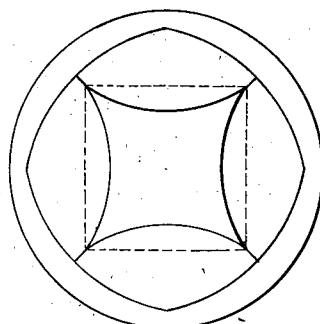


Fig. 6

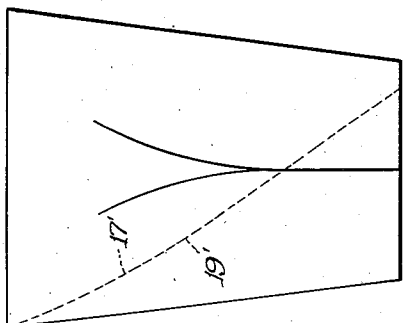


Fig. 3

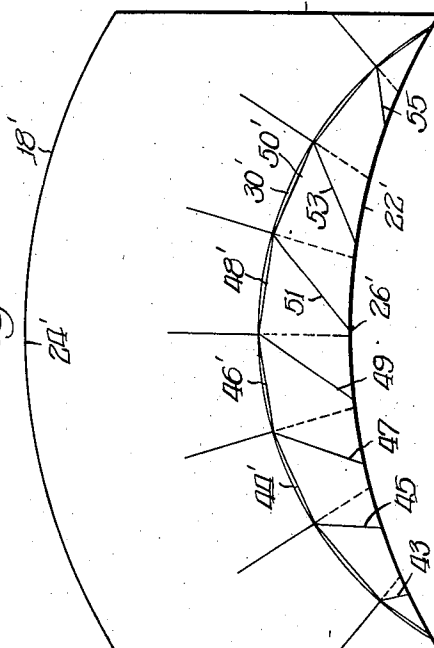


Fig. 5

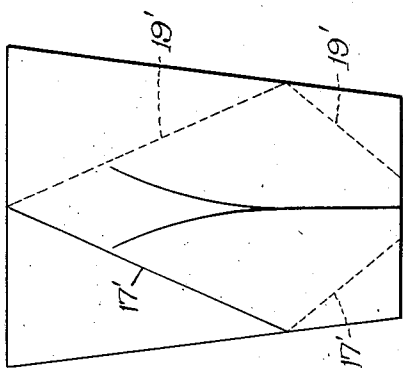
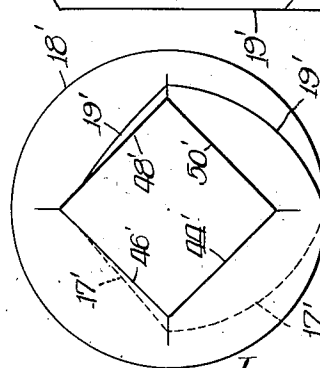


Fig. 4



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Fig. 11.

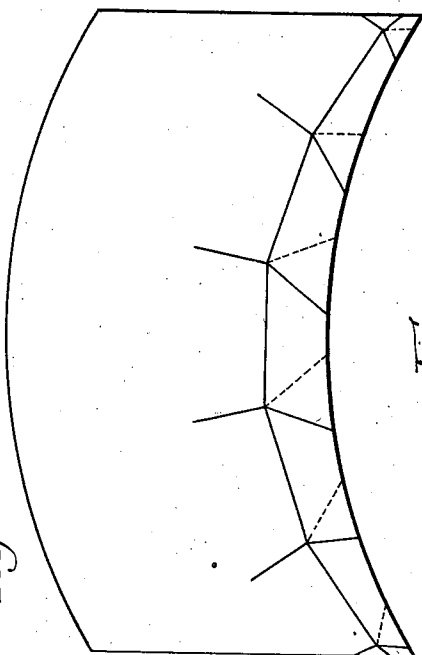


Fig. 12.

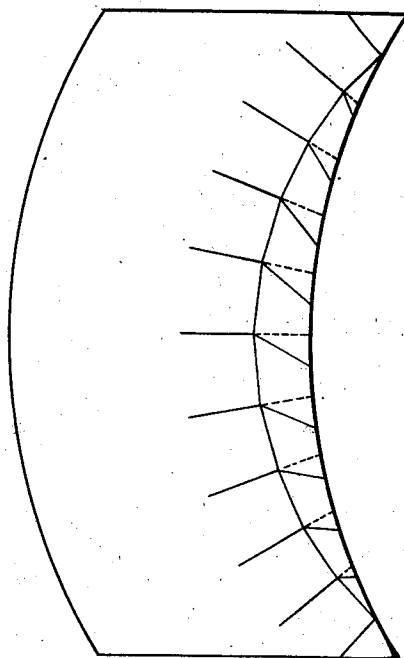


Fig. 9.

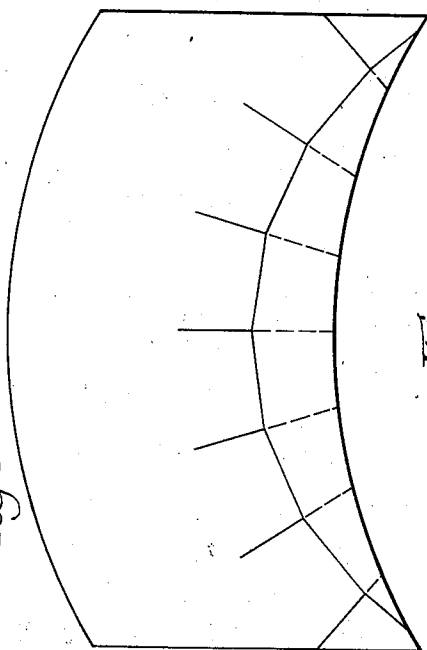
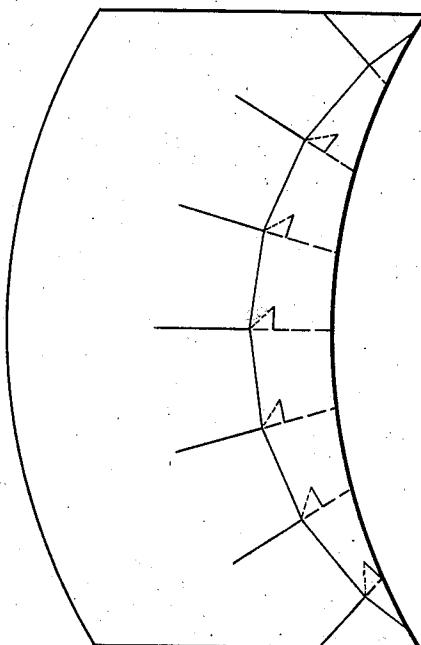


Fig. 10.



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UNITED STATES PATENT OFFICE

2,134,321

RECEPTACLE

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Application December 28, 1936, Serial No. 117,719

13 Claims. (Cl. 229—21)

This invention relates to receptacles, more particularly paper containers, and has for an object thereof the provision of an improved type of paper receptacle having a polygonal flat base and a circular open mouth and which may be used in dispensing water, soda and other liquids.

A cup having a flat polygonal base and a circular mouth has been described by Elliott, U. S. Patent 1,073,481, granted September 16, 1913. Certain modifications of the Elliott cup have also been described by other workers in the art, as, for example, by Novick, U. S. Patents 1,910,177 and 1,910,178 granted May 23, 1933, in which the cup has a pull flap either at the base or extending throughout the length of the body portion.

In making such cups or receptacles as heretofore previously proposed, owing to the shape or configuration of the blank, a considerable amount of the paper is wasted. Such paper is scrapped and forms no part of the finished cup.

It is an important feature of the present invention to provide a cup blank and an improved cup formed therefrom which may be made from a roll of paper, without any substantial loss or waste thereof.

In accordance with the practice of the invention a roll of paper, the width of which corresponds to the width of the cup blank, is cut transversely in a manner hereinafter to be described to form a series of blanks without waste.

The improved cup formed from the blanks hereinabove described is distinguished from previously described cups having a flat polygonal base by the fact that portions of the blank which would ordinarily be wasted are utilized in making the cup and serve to reinforce portions of the side walls thereof to produce a cup made from a single piece of paper, or other suitable flexible material, which is relatively more rigid and less likely to collapse than previously described cups referred to above. The provision of a cup of this type permits the use of lighter stock and inasmuch as there is no waste a stronger cup is obtained. In other words, although the paper stock may be lighter, the entire stock goes into the cup, none of it being scrapped with the result that a stronger, substantially non-collapsible single piece container is produced.

Other objects and features of the invention will become apparent from a reading of the following specifications in the light of the accompanying drawings, in which

Figure 1 shows a strip of paper having dotted lines appearing thereon to indicate the manner in which the blanks are cut;

Figure 2 is a view of a blank for forming a cup having a square base showing a method in which the side walls and boundary lines thereof may be defined;

Figure 3 is a modification of the blank illustrated in Figure 2;

Figure 4 is a top view looking down into a cup formed from a blank of the type illustrated in Figure 3;

Figure 5 is a side elevational view of the cup formed from the blank of Figure 3, and shown in plan view by Figure 4;

Figure 6 is a side elevational view of the cup illustrated in Figure 5 as it appears when the cup of Figure 5 is turned clockwise at an angle of ninety degrees;

Figure 7 illustrates a side elevational view of a modification of the cup shown in Figures 3 to 6, the modified cup having the sides and bottom bulged inwardly;

Figure 8 is a plan view looking down into the cup of Figure 7;

Figure 9 is a modification of the blank illustrated in Figure 3 without the crease or fold lines in the base portions;

Figure 10 is a modification of the blank of Figure 3 showing a different arrangement of fold lines in the base portion;

Figure 11 illustrates a blank suitable for the production of a cup having a triangular base and a circular top;

Figure 12 illustrates a blank suitable for the production of a cup having a hexagonal base and a circular mouth.

As illustrated in Figure 1, a strip of paper 10, the width of which corresponds to the width of the cup blank to be formed therefrom, is fed from a roll of paper not shown. Any suitable means as, for example, a knife, is arranged in position to cut the free extremity 12 of the strip 10. As illustrated, the shape of the cut is arcuate, the center of the arc corresponding with the longitudinal axis of the strip. All of the arcs have equal radii with the centers on the same vertical axis outside of the blank formed by any two successive arcs. As the strip is fed past the knife successive cuts indicated by the dotted lines 14, 16, etc. are made whereby are formed a series of identical blanks having their upper and lower edges correspondingly curved and their side edges parallel.

As illustrated in Figure 2, the center of convex arc 18 is at point 20 outside of the blank, in this particular figure the radius of arc 18 being twice the height of the blank and the distance

24—26 being equal to each of the distances 20—26 and 20—28. Point 28 is the center of the concave arc 22.

The base portion is defined and bounded by chords of an arc 30 which is concentric with the arc 18, that is, has its center at the same point 20, and which, as shown in Figure 2, intersects at points 32 and 34 with the parallel side edges and the concave lower edge of the blank. The portion of the blank available for formation of the base is determined by the radial dotted lines 20—36 and 20—38. The distance between the points of intersection 40 and 42 of these radial lines with the concentric circle 30 when divided into the desired number of chords determines the perimeter of the base. The number of sides to the polygon forming the base may, of course, be varied as, for example, 3, 4, 5, 6, etc., by varying the number of chords between the points 40—42. In Figure 2 there are four chords, 44, 46, 48 and 50, which when folded in the manner hereinafter described produce a four-sided base. These chords are preferably of equal length, although this is not essential. The lines 52, 54, 56, 58 and 60 are radial projections from the center 20 of the convex arc 18 through the terminal points of the chords 44, 46, 48 and 50.

The portions of the blank enclosed between the points 40, 42, 62 and 64 are base overlap portions and are either cut, creased or folded in such a way that they form a flat leak-proof base when turned inwardly and adhesively secured. The portions of the blank enclosed by the chords and lines drawn between the points 32, 36 and 40, and 34, 38 and 42 are side wall overlap portions and serve to strengthen and reinforce the side walls of the cup. Portions of the blank enclosed within lines drawn from points 32, 40 and 64, and 34, 42 and 62 may either be bottom overlap portions or side wall overlap portions. In the latter case they are severed along the lines 40—64 and 42—62. The entire area enclosed within the chords of the concentric arc 30 and the bottom edge of the blank 22 may be cut along the dotted lines in order to form the overlap portions, or may be creased, that is, folded without cutting, for instance as shown in Figure 3.

It will be observed that the configuration and area of the bottom overlap portions should preferably be such that these overlap portions do not extend beyond the base. This is governed by the radius of the concentric circle 30, the chords of which form the sides of the base, and also by the number of chords, that is, the number of sides in the polygon forming the base of the receptacle. The radius of the concentric circle 30 in turn is governed in part by the distance between the center 20 of the convex arc 18 and the concave arc 22 along line 20—26. In Figure 2 this distance 20—26 is approximately equal to the distances 24—26 and 20—28 and the concentric arc, as illustrated, intersects both the parallel side edges 17 and 19 and the concave lower edge 22 at the points 32 and 34. However, if the center 20 were closer to the arc 22 of the blank than the radius of concentric arc 30 should be smaller. On the other hand if the center 20 were farther away from arc 22 than illustrated in Figure 2 the concentric arc 30 should have a greater radius. In general, the distance 26—70 should be such that the base portions defined in part by chords 44, 46, 48 and 50 overlap when folded toward each other but do not overlap the side walls of the cup. In other words, the distance 26—70 should preferably not exceed the length of chords

44—46, etc. Otherwise, overlapped portions will be formed which, unless folded under, will extend into the side walls of the cup.

The blanks are symmetrical with respect to the longitudinal axis A—A of the strip of paper (Fig. 1). That is to say, for every point on the blank to the left of the axis A—A there is a corresponding point on the portion of the blank lying to the right of the line. Every portion of the blank may be employed in forming the cup and due to the reinforced or strengthened portions of the cup thus produced a lighter stock may, if desired, be employed and a stronger structure will be obtained by reason of having entirely eliminated waste. It is believed that this is the first paper cup of this type, that is a cup having a flat polygonal base and a circular mouth, to be formed from a continuous strip of paper without waste. In this connection it may be remarked that if desired the sharp tips or points, 32, 34, shown in Figure 2, or in any of the other Figures 4, 9, 10, 11 and 12, may be removed for example by cutting along the dotted lines 66, 68 (Fig. 2) although it will be appreciated that such loss of paper is inconsequential and immaterial. In other words, notwithstanding the removal of these tiny segments it may be appropriately stated that the cup blank is formed substantially without waste of material.

In forming the cup the blank is rolled so that the points 36, 38 (Fig. 2) substantially coincide, forming the mouth of the cup. At the same time, the base portions between the chords 44, 46, 48 and 50 of the concentric circle 30 and the concave arc 22 are folded inwardly, overlapping each other, and adhesively secured together in any suitable manner adapted to produce a flat polygonal base. Side wall flaps 32, 40, 36, and 34, 38, 42, are folded and are adhesively secured to the side walls of the cup in such a manner that the lines 36, 40 and 38, 42 coincide, one of said flaps being on the inside of the cup and the other on the outside of the cup with the points 32 and 34 terminating substantially at the base of the cup. The portions 34, 42, 62 and 32, 40, 64 are preferably folded under and adhesively secured to the base, forming a part thereof. If desired, one or both radial lines 20—36 and 20—38 may terminate at arc 18 at intermediate points nearer the axis B—B. In this case when the cup is formed terminal portions of the arc 18 are overlapped.

In Figure 3, as distinguished from Figure 2, the parallel sides 17', 19' intersect the convex and concave arcs 18' and 22'. The concentric arc 30' intersects the arc 22', rather than the corners of the blank as shown in Figure 2. The height of the blank 24'—26' is greater than the radial distance from the arc 22' to the center of the convex arc 18'. The crease or fold lines 43, 45, 47, 49, 51, 53 and 55 are tangents of a circle, not shown, concentric with arc 18'. Chords 44', 46', 48' and 50' correspond to chords 44, 46, 48 and 50, respectively, of Figure 2, and are obtained in a similar manner. When the blank of Figure 3 is rolled and folded as described above, the cup presents a plan view as shown in Figure 4 and elevational views as shown in Figures 5 and 6.

The various bottom and side wall laps may be adhesively secured, for example, by means of glue in any suitable manner preferably with the aid of a former of any suitable design adapted to fit within the cup and having a flat base substantially the same as the base of the cup, although somewhat smaller, and a circular top slightly smaller than the mouth of the cup. This former

may be provided with an ejector in order to eject the cup after the overlapped portions have been glued. Furthermore, the cup may be mounted over the former in such a manner as to produce flat paneled portions in the side walls and symmetrical crease lines such as are shown in Figures 5 and 6. This may be accomplished by using a former with side walls converging from a circular top toward a polygonal base, generally frusto-conical in shape, but having flat portions in the side walls arising at an oblique angle from the sides of the polygonal base and terminating near the top of said former. The cup may be shaped by pressing it between two complementary formers.

While a cup with a round or circular mouth is usually preferred for drinking purposes, if desired, by running the fold or crease lines 52, 54, 56, 58 and 60 (Fig. 2) to the top of the cup a receptacle having a polygonal mouth may be formed. This also may be effected on a suitable former.

In Figures 7 and 8, the cup, as illustrated, has concave side and base portions, somewhat similar to the effect obtained in a pinch bottle. This effect may be obtained by pressing the cup over a former having concave side and base portions. The edges of the base may be in a horizontal plane so that the base extends outwardly from lower portions of the side walls of the cup, as shown by the dotted lines in Figure 8. Alternatively the edges of the base may be in a vertical plane, forming a continuation of the side walls, and presenting an appearance, when looking down into the cup, similar to that of Figure 8 with the dotted lines omitted. Concaving the sides and bottom serves to increase the rigidity of the cup.

In Figures 3, 9, 10, 11 and 12, the full lines fold up, the dotted lines fold down and the dash lines are cut. Thus, the base or bottom of the cup produced from the blank of Figures 3, 11 and 12 is produced entirely without cutting. The tangential base fold lines in Figures 11 and 12 are obtained in the same manner as those in Figure 3, that is, they are tangents of an arc outside of the blank and concentric with the convex side. This method of folding the base portions without cutting is believed to be novel in this type of vessel and may be applied generally to blanks having curved upper and lower edges, regardless of whether the side edges are parallel or converging. This method of folding may also be applied where the base overlap portions are defined by concentric arcs, that is, where the curved sides of the blank have different radii but the same center of curvature.

In Figures 9 and 10, portions of the base are cut but without waste. The dotted fold lines in the base portions of Figure 9 bisect the angles formed by the dash lines (radial lines) and the chords of the concentric arc.

It will be recognized that the cup or container comprehended by this invention may be used for various purposes and that modifications in the design and construction of the cup may be made, for instance, other pliable sheet materials, e. g., moisture-proof regenerated, transparent, or translucent cellulosic materials, rubberized sheet materials, and the like, may be substituted for paper without departing from the true spirit of the invention as set forth in the appended claims.

Having thus described the invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A blank for forming single piece receptacles having a flat polygonal base, said blank comprising an arcuate convex side and an arcuate concave side having equal radii with the centers of said arcuate sides on the same vertical axis outside of the blank, parallel side edges, and side wall fold lines defined by straight lines between the center of radius of curvature of the convex side and the intersections of said side with the parallel side edges.

2. A blank for forming single piece vessels having a flat polygonal base, said blank comprising parallel side edges, an arcuate convex upper edge and an arcuate concave lower edge having the same radius as the upper edge and with the centers of both arcuate edges outside of the blank, and base fold lines defined by chords of a circle concentric with the convex arcuate upper edge.

3. A blank for forming single piece vessels having a flat polygonal base, said blank comprising parallel straight side edges, an arcuate convex upper edge and an arcuate concave lower edge having the same radius of curvature as the upper edge with the centers of the arcuate upper and lower edges on the same vertical axis outside of the blank, fold portions adapted to be folded inwardly to form the base and bound in part by chords of a circle concentric with the convex arcuate upper edge, in part by the concave lower edge and in part by radial lines joining the center of radius of curvature of the convex side with the convex side, said fold portions being of such size that they will overlap when folded inwardly toward the central vertical axis of the cup, without overlapping the side walls, and side wall fold portions defined in part by lines joining the center of the convex side with the intersections of the convex side and the parallel sides and in part by the parallel sides.

4. A blank for forming single-piece vessels having a flat polygonal base, said blank comprising parallel straight side edges, an arcuate convex upper edge and an arcuate concave lower edge having the same radius of curvature as the upper edge with the centers of the arcuate upper and lower edges on the same vertical axis outside of the blank, and side wall fold portions defined in part by the lines joining the center of the convex side with the intersections of the convex side and the parallel sides and in part by the parallel sides.

5. A non-collapsible, leak-proof, single piece open-mouthed receptacle having a flat polygonal base formed from a blank having straight parallel side edges and curved upper and lower edges of equal radii with the centers of said upper and lower edges at different points on the same vertical axis outside of the blank, said blank being wound with the convex upper edge forming the mouth of the receptacle, the side edges overlapping and running diagonally toward the base of the receptacle, and the base of the receptacle being formed by folding inwardly in the direction of the central vertical axis of the receptacle and adhesively securing together portions of said blank defined in part by the lower concave arc and in part by a plurality of chords of an arc concentric with the convex upper edge and close enough to the lower edge to permit the portions between said chords and the lower edge to be overlapped and form a leak-proof base.

6. A cup as claimed in claim 5 in which the side walls have flat panel portions.

7. A cup as claimed in claim 5 in which the side walls and bottom are concave.

8. A cup as claimed in claim 5 in which the portions forming the base contain crease lines tangential to an arc outside of the blank concentric with the convex side of the blank.

9. A non-collapsible, leak-proof, single piece open-mouthed receptacle having a flat polygonal base formed from a blank having curved upper and lower edges and straight side edges, said blank being wound with the curved upper edge forming the mouth of the receptacle, the side edges overlapping and adhesively secured together, and the base of the receptacle being formed by folding inwardly portions of said blank defined in part by the lower edge and in part by a plurality of chords of an arc concentric with the upper edge, said portions being folded in part along crease lines from the termini of the chords tangential to another concentric arc outside of the blank.

10. A blank for forming single piece paper receptacles having a self-sustaining polygonal base, said blank comprising straight parallel side edges, an arcuate convex side and an arcuate concave side having the same radius of curvature as the convex side and with the centers of both the convex and concave arcs on the same central vertical axis outside of the blank, and base fold lines defined by chords of a circle concentric with the arcuate upper edge.

11. A non-collapsible, single piece, open-

mouthed paper receptacle having a polygonal base formed from a blank having straight parallel side edges and curved upper and lower edges of equal radii, said blank being wound with the curved upper edge forming the mouth of the receptacle the side edges overlapping and secured together and the base being formed by folding inwardly in the direction of the central vertical axis of the receptacle and securing together portions of said blank defined in part by the lower concave arc and in part by a plurality of chords of an arc concentric with the convex upper edge and close enough to the lower edge to permit the portions between said chords and the lower edge to be overlapped.

12. A non-collapsible, single piece, open-mouthed paper cup having a polygonal base and side walls which converge from the mouth toward the base, said cup having concave side wall portions and a concave base adapted to increase the rigidity thereof.

13. A non-collapsible, single piece paper cup having a polygonal base formed from a blank having curved upper and lower edges and straight side edges, said blank being wound with the curved upper edge forming the mouth of the cup, the side edges overlapping and secured together and the base formed as a polygon from lower portions of the blank, said cup having concave portions adjacent edges of the polygon at the base.

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