Dec. 10, 1940. W. E. AMBERG 2,224,129

METHOD OF MAKING PAPER CUPS

Filed Feb. 8, 1939

Fig. 1.

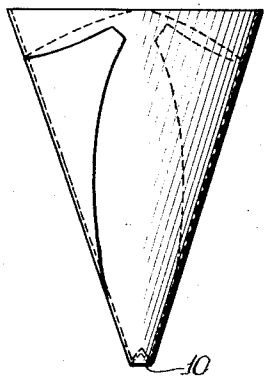


Fig. 3.

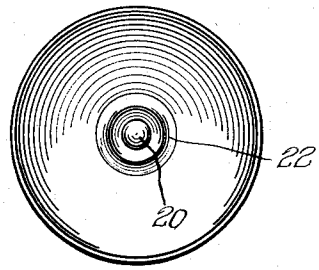


Fig. 2.

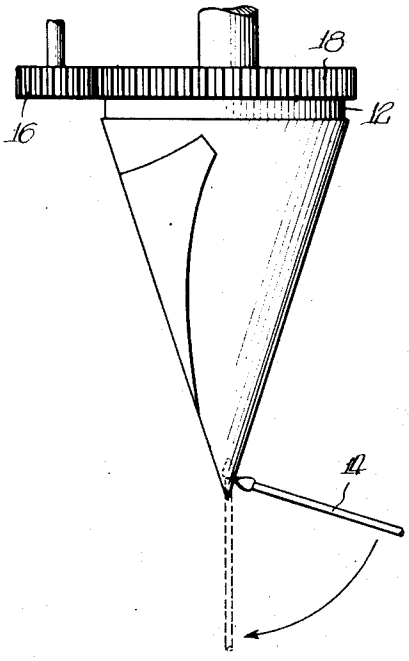
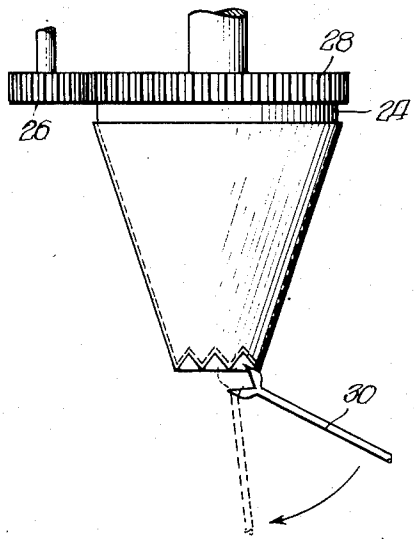


Fig. 4.



INVENTOR.
Walter E Amberg,
BY Richard Spencer
ATTORNEY.

Patented Dec. 10, 1940 2,224,129

UNITED STATES PATENT OFFICE

2,224,129

METHOD OF MAKING PAPER CUPS

Walter E. Amberg, Chicago, Ill., assignor to Universal Paper Products Company, Chicago, Ill., a corporation of Illinois

Application February 8, 1939, Serial No. 255,181

5 Claims. (Cl. 93—36.2)

This invention relates to improvements in receptacles and is particularly applicable to cone-shaped paper vessels that are commonly employed today in dispensing water, soda and other liquids.

In the manufacture of cone-shaped receptacles it is common to wrap a blank of desired shape about a mandrel and to secure the blank in its wound condition by means of adhesive applied during the operation. Owing to the small dimensions that are encountered in the apex portion of the cup it is sometimes difficult to apply adhesive properly, with the disastrous result that the vessel may leak. Additionally, a sharp point on the cup is undesirable from the standpoint of safety since it affords a weapon with which a child or other person might possibly injure himself. Indeed, it is known that cuts and gashes have frequently been caused from the sharp points of cone-shaped paper drinking cups.

With these problems in mind it has previously been proposed to blunt the end of a cup by applying a tripping pressure to the point, resulting in the collapse of the paper at that locality. The crushed point, however, is subject to numerous disadvantages which may be briefly referred to. In the first place, the paper itself is broken down, causing a weakening of the apex rather than the desired strengthening. Furthermore, the paper stock from which cups are commonly made has a certain amount of inherent resiliency which causes the crushed point to spring back to its original shape. Particularly during shipping where vibration sets up is this tendency prevalent. Both the crushing and the springing back tend to weaken the apex, resulting in leakage or otherwise weakening the cup at this point.

One of the objects of the present invention is to provide a new and improved method of reshaping the apex portion of a cone-shaped cup in order to provide a cup which meets the necessary safety requirements and is greatly strengthened at the apex.

Another object of this invention is to provide a new and improved method for reshaping the apex portion of a cone-shaped vessel to form a vessel which is self-sustaining, or what might be termed a flat bottom cup. Other objects will appear hereinafter.

In accomplishing these objects in accordance with this invention the method involved comprises forming an inverted or reversed point or a plurality of recesses in the apex portion of a cone shaped cup by what may be described as a rolling motion. According to this method a vessel is first shaped from a flexible sheet material such as paper into a substantially true conical form and the apex portion is subjected to pressure which is exerted initially against a side of the apex and changes in direction to an endwise pressure toward the mouth of the cup, preferably while the cup is being rotated, until a recess or a plurality of recesses is formed in the apex portion. If it is desired to form a plurality of recesses, a special tool is employed as hereinafter more fully described.

By inverting or reversing the point or apex of a cone-shaped vessel in this manner it is possible to obtain better reshaping of the apex than by a mere stamping operation in conjunction with heat, as described in U. S. Patent 2,104,535. The method herein described may be accomplished with or witnout the utilization of heat which may be applied either to the reshaping tool or to the vessel which is being reshaped, or to both. Since drinking cups, soda cups and other vessels of the type herein contemplated ordinarily contain a thermoplastic or wax-like material, any heat which is supplied during the reshaping operation will naturally tend to melt such material. As previously stated, however, the application of heat is unnecessary in carrying out the present invention.

Other advantages and features of the invention will become apparent from a reading of the following specification in the light of the accompanying drawing, in which:

Figure 1 is a side view of one form of cup constructed in accordance with this invention;

Figure 2 is a view illustrating one form of mechanism for use in practicing the present invention;

Figure 3 is a bottom view of a modified form of cup made in accordance with this invention; and

Figure 4 is an elevational view of a mechanism suitable for forming the modified type of cup illustrated in Figure 3.

The cup illustrated in the drawing is of the same type as that which forms the subject matter of my United States Patent No. 2,056,893, issued October 6, 1936, to which reference may be had for a full and complete description of the cup and the manner of forming it. It may be observed that this cup has an edge of material terminating in the apex with only a small amount of overlap of the material in the apex portion of the cup and with single thicknesses of material adjacent portions of the apex and extending to the tip of the apex.

As shown in Figure 1, the cup has been treated in such a manner as to form a concavity or a recess 10 in the apex portion of the cup. This has been done by reversing or inverting the point and giving it a slightly rounded shape.

As shown in Figure 2, inversion of the point or apex may be accomplished by mounting the cup on a mandrel 12, which is conventional with the exception that its apex has been removed and replaced by a cavity or recess conforming in shape to that which it is desired to impart to the cup. Preferably the various angles of the W-shaped extremity 10 of Figure 1 are equal, otherwise, surplus paper will be present. The same is true of the angles shown in Figure 4.

As illustrated, the formation of the recess in the apex of the cup may be accomplished by a spinning tool 14 which starts from a full line position and as it moves inwardly it likewise moves downwardly until it assumes the dotted line position, at which time the spinning operation is completed and the recess is formed. During the operation the cup on mandrel 12 is constantly rotated, the rotation being imparted by a gear 16 which drives gear 18. The latter gear is fixedly connected to the end of mandrel 12. It will be understood that any convenient means may be employed for driving the mandrel and rotating the cup, and that other methods may be used without departing from this invention. The manner of constructing a spinning tool 14 and its method of operation will be readily understood from the description given.

In Figures 3 and 4 there is shown a cup with a central recess 20 and a surrounding recess 22. In producing this type of bottom it is desirable to form the annular recess 22 first and secondly form the central recess or concavity 20. This may be accomplished by mounting a cup in substantially truly conical form on a mandrel 24 having a truncated apex of a configuration corresponding to the bottom of the cup illustrated in Figure 4, although it will be appreciated that by spinning and similar operations it may be possible to eliminate the mandrel or at least to provide a mandrel having the bottom shaped in the manner described.

In Figure 4 the cup is rotated in any suitable manner through gears 26 and 28. As the cup is rotated a tool 30 is applied against the side of the apex and by the spinning operation annular recess 22 is formed. At the same time tool 30 moves from a full line position in which it is exerting force largely against the side of the cup until it assumes the position shown by the dotted lines wherein pressure is exerted substantially in the direction of the longitudinal axis of the cup toward the mouth thereof and central recess 20 is formed.

When a cone-shaped paper cup has a recess, or recesses of this type formed in its apex, it causes the seam of the cup which extends from the upper edge thereof and terminates in the apex to become locked by being folded upon itself. In the ordinary cup of this type the blank can be unwound during which operation the apex likewise unwinds easily. However, in accordance with the practice of the present invention, the blank can be unwound with freedom only until the apex is reached, and there, owing to the inverted point and the interlocking that is brought about by reason thereof, further unwinding is obstructed and tearing may take place before the blank can be opened entirely. This produces a leakproof apex and affords increased rigidity and balance at the base of the cup.

It will be appreciated that dimensions form no part of the invention herein described or illustrated and that accordingly, the depth of the inversion or recess may be varied as desired. Furthermore, its shape or configuration may be changed to meet various needs or conditions. The invention is applicable to various types of cone-shaped vessels made of paper, Cellophane or other types of suitable material and finds particular application to blanks of the type described in my patent hereinabove referred to in which there is only a small amount of overlap of the paper in the apex portion of the cup, and therefore, no overlapping wrapping of the paper about the point as is customarily done in connection with other well known cups. Inasmuch as cups of the type referred to have only a single thickness of paper adjacent portions of the apex, the recess or recesses are readily "rolled" into the apex by starting the indenting pressure of the tools 14 (Figure 2) or 30 (Figure 4) against this single thickness portion.

It will be understood that my invention is not limited to cups of the type described in my patent previously referred to but may be used in connection with other well known cups. It is an outstanding feature of my invention that the reshaping of the apex occurs with what may be termed a rolling movement as distinguished from a crushing pressure exerted against the tip of the cup only toward the mouth thereof. For the purpose of the invention it is immaterial whether the change in the direction of the pressure is effected by movement of the tool 14 (Figure 2) or 30 (Figure 3) or by changing the direction of movement of mandrel 12 (Figure 2) or mandrel 24 (Figure 4) with respect to the tool.

This application is a continuation-in-part of my copending application, Serial No. 128,018, filed February 26, 1937.

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

1. A method of making drinking vessels from flexible sheet material which comprises shaping said material into substantially true conical form with single thicknesses of material adjacent portions of the apex, and re-shaping said apex portion including the single thickness portion by exerting pressure against a side of the apex laterally with respect to the longitudinal axis of the cup and uniformly changing the direction of said pressure until it is exerted inwardly and generally along the longitudinal axis of the cup toward the mouth thereof to produce a recess in the end thereof.

2. A method of making cone-shaped drinking vessels which comprises forming a cone-shaped vessel from a flexible sheet material into a substantially true conical shape, rotating said vessel about its longitudinal axis and exerting pressure against the apex thereof while said vessel is being rotated, said pressure being exerted initially against a side of the apex and changing in direction to an endwise pressure toward the mouth of the cup until a recess is formed in the apex portion.

3. A method of making cone-shaped vessels having a recessed end portion which comprises forming a cone-shaped cup of substantially true conical form from a flexible sheet material, rotating said cup around its longitudinal axis and simultaneously with said rotation exerting a spin-

ning lateral pressure against the side of the apex, and changing the direction of said pressure until said pressure is exerted substantially in the direction of the longitudinal axis of the cup toward the mouth thereof.

4. A method of making cone-shaped vessels having a plurality of recesses in the end portion which comprises forming a cone-shaped cup of substantially true conical form from a flexible sheet material, exerting pressure against a side of the apex tending to press the same inwardly to form an annular recess and changing the direction of said pressure inwardly and upwardly toward the mouth of the cup in the general direction of the longitudinal axis thereof to form a central recess.

5. The method of making cone-shaped vessels from a flexible sheet material which comprises shaping said material into substantially true conical form, and re-shaping the apex portion by exerting pressure agains a side of the apex laterally with respect to the longitudinal axis of the vessel and uniformly changing the direction of said pressure until it is exerted inwardly and generally along the longitudinal axis of the cup toward the mouth thereof to produce a recess in the end thereof.

WALTER E. AMBERG.

CERTIFICATE OF CORRECTION.

Patent No. 2,224,129. December 10, 1940.

WALTER E. AMBERG.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 23, for "tripping" read --tapping--; page 3, second column, line 7, claim 5, for "agains" read --against--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of January, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.