June 5, 1956 W. E. AMBERG ET AL 2,749,010

TRUNCATED CONICAL PAPER CUP

Original Filed Feb. 9, 1950 2 Sheets-Sheet 1

Fig. 1

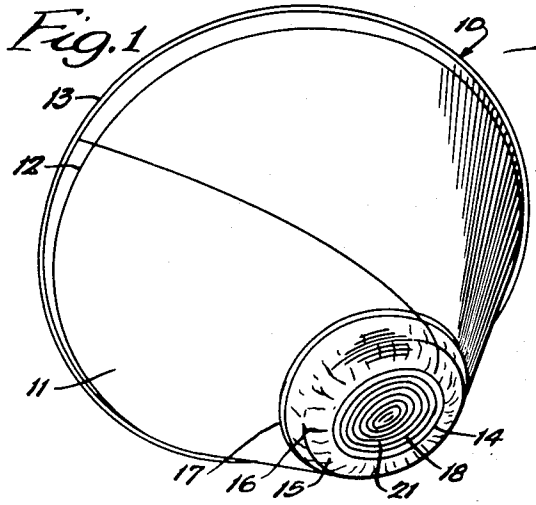


Fig. 2

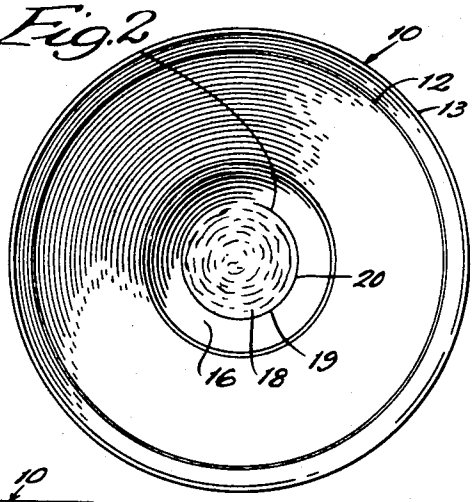


Fig. 5

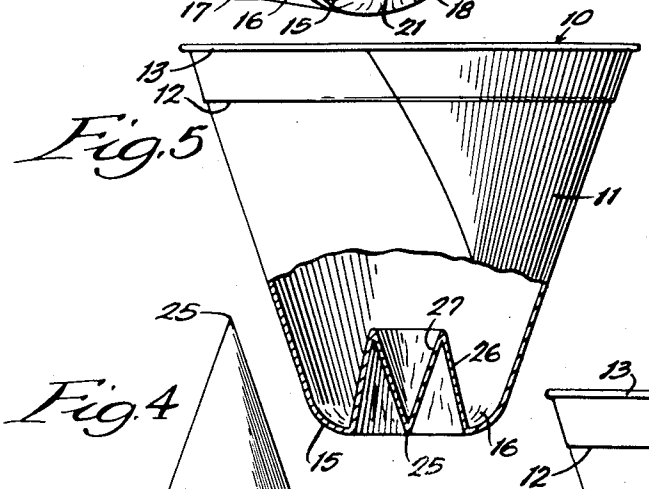


Fig. 4

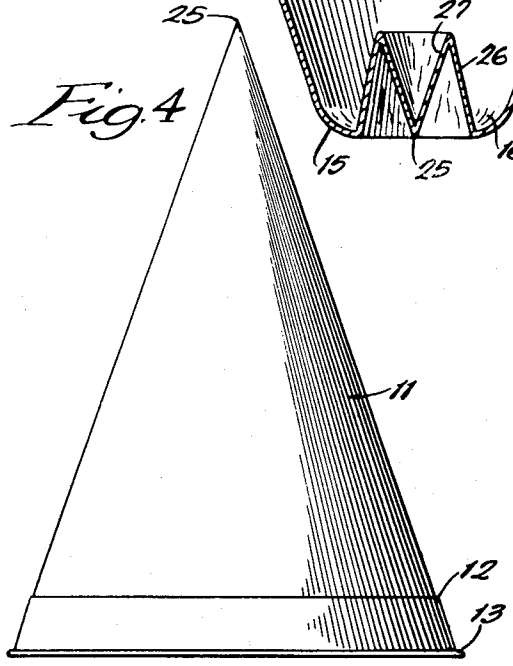
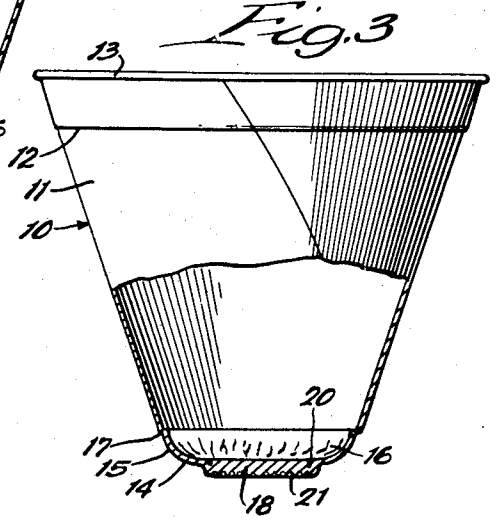


Fig. 3



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Fig. 6

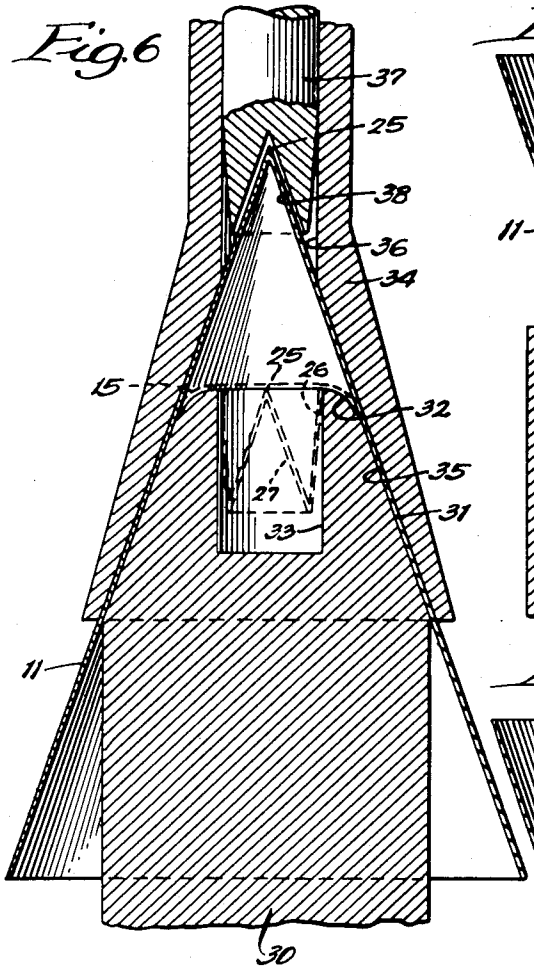


Fig. 7

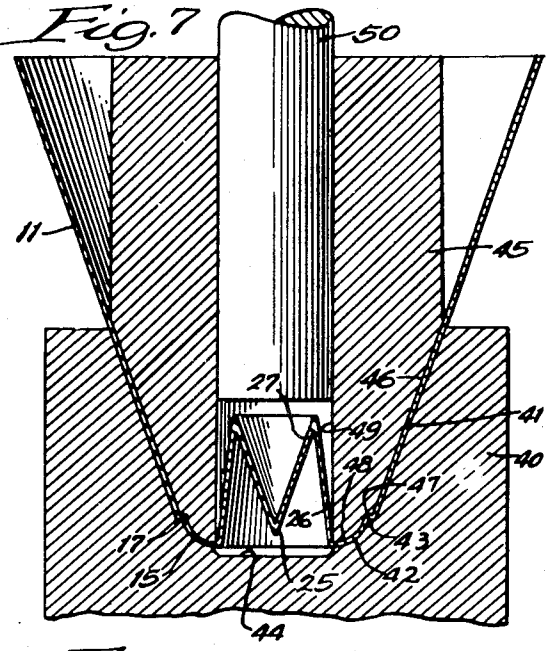
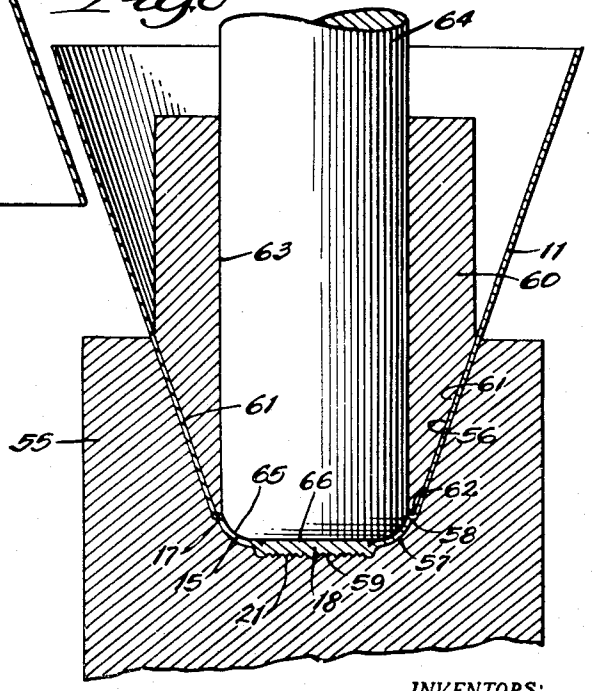


Fig. 8



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TRUNCATED CONICAL PAPER CUP

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Original application February 9, 1950, Serial No. 143,292. Divided and this application June 5, 1953, Serial No. 359,742

1 Claim. (Cl. 229—1.5)

This invention relates to a truncated conical paper cup having a substantially transverse spoon serviceable bottom and this application is a division of our application Serial No. 143,292, filed February 9, 1950, now Patent No. 2,673,496.

In Patent No. 2,473,840 dated June 21, 1949, there is disclosed and claimed a truncated conical single piece paper cup having a substantially transverse spoon serviceable bottom which produces new, useful and unexpected results which cannot be produced by conventional pointed or blunted conical paper cups. It eliminates inaccessible portions into which dissolvable solids or syrup may collect or settle when the contents of the paper cup are agitated for mixing purposes.

The bottom of that paper cup also directs the motion of the fluid in the cup when agitated for suspending dissolvable solids or syrup to aid in the dissolving and mixing thereof. Further, the entire interior of said paper cup is accessible to and serviceable by a conventional spoon so that all of the contents thereof may be removed by the spoon. Said paper cup is ideally suited for soda fountain use for servicing sodas, mixed drinks and the like. It has had a remarkable commercial success and has made a tremendous impact on the art.

The truncated conical single piece paper cup of the aforementioned patent is of less than sixty degree angle and the substantially transverse spoon serviceable bottom is formed by circumferenially gathering and pleating the paper of an appreciable portion of the acute angled side wall of a conical paper cup at the apexial end thereof into substantially transverse pleated surface. Accordingly, an appreciable amount of paper at the apexial end must be regularly gathered and pleated into the spoon serviceable bottom. The larger the diameter of the spoon serviceable bottom the more the paper that must be gathered and pleated. Likewise, the smaller the cone angle the more the paper that must be gathered and pleated to form a spoon serviceable bottom of predetermined diameter.

As a practical commercial matter, therefore, the diameter of the spoon serviceable bottom and the relationship between the diameter of the spoon serviceable bottom and the cone angle of the truncated frusto-conical single piece paper cup, formed in the manner set forth in the aforementioned patent, are limited. Manufacturing difficulties are encountered in regularly gathering and pleating the necessarily large amounts of paper required to form strong and neat appearing spoon serviceable bottoms of very large diameters or in paper cups of extremely small cone angles. The problem becomes particularly acute when it is attempted to provide very large diameter spoon serviceable bottoms on paper cups having very small cone angles.

The principal object of this invention is to provide a new and improved truncated conical single piece paper cup having a substantially transverse spoon serviceable bottom wherein the spoon serviceable bottom may be larger and the cone angle smaller than heretofore commercially practicable.

In carrying out this object of the invention an appreciable portion of an acute angled conical paper side wall of less than sixty degree angle is inverted at the apexial end thereof into an internally located extension.

The internally located extension may be frusto-conical in configuration and may have a reentrant conical portion. The portion of the conical paper side wall adjacent the internally located extension may be circumferentially gathered into a substantially transverse annular surface. The internally located extension is compressed into a substantially transverse surface merging with the substantially transverse annular surface. In this way large amounts of paper at the apexial end of the conical paper side may be uniformly gathered, pleated, and compressed into a strong and neat appearing spoon serviceable bottom. Commercially practicable large diameter spoon serviceable bottoms thus may be readily provided on paper cups having small cone angles. The spoon serviceable bottom thus formed has an annular portion provided with substantially radially disposed pleats and a central portion provided with substantially circumferentially disposed pleats, which are so compressed as to provide a substantially smooth inner surface.

A further object of this invention resides in the construction of the truncated conical paper cup with the substantially transverse spoon serviceable bottom formed in accordance with the method of this invention. In accordance with this object of the invention the truncated conical single piece paper cup of less than sixty degree angle includes an acute angled substantially smooth frusto-conical side wall and a substantially transverse spoon serviceable pleated bottom merging with the side wall, the bottom having an annular portion provided with substantially radially disposed pleats and a central portion provided with substantially circumferentially disposed pleats. While the inner surface of the substantially transverse spoon serviceable bottom is preferably concave, such as rounded, it may be of any other desired shape.

The truncated conical paper cup of this invention is particularly useful as a coffee cup when it is of relatively small height, has a relatively large spoon serviceable bottom and has a relatively small cone angle. In fact, the conical paper cup of this invention may be adaptable to innumerable uses by varying the dimensions of height, width, and cone angle, all of which may be conveniently done within the method of this invention.

Other objects of this invention will become apparent to those skilled in the art upon reference to the accompanying specification, claim and drawings, in which—

Figure 1 is a perspective bottom view showing the outside of a paper cup of this invention;

Figure 2 is a top plan view illustrating the inside of the paper cup;

Figure 3 is a side elevational view partly in section of the paper cup of this invention;

Figure 4 is a side elevational view of a conventional paper cup which may be utilized for forming the paper cup of this invention;

Figure 5 is a side elevational view partly in section illustrating the condition of the paper cup of this invention at an intermediate stage in the formation thereof;

Figure 6 is a sectional view illustrating one manner in which a conical paper cup is provided with an internally located extension;

Figure 7 illustrates one manner in which the internally located extension may be compressed; and

Figure 8 illustrates one manner in which the spoon serviceable bottom may be finally formed.

Referring first to Figs. 1 to 3, the truncated conical single piece paper cup of this invention is generally designated at **10**. It includes an acute angled, substantially smooth frusto-conical side wall **11** of less than sixty degree angle. The large end of the paper cup may be embossed as at **12** and provided with a suitable rim **13**, if so desired. A substantially transverse spoon serviceable bottom **14** merges with the side wall **11**. The bottom

14 has an annular portion 15 including a plurality of apexially and circumferentially gathered and radially disposed pleats 16. In order to provide a clear line of demarcation between the spoon serviceable bottom and the side wall, the juncture between the two may be provided with an offset 17. The annular portion 15 of the spoon serviceable bottom terminates inwardly in a transverse, compressed central portion 18. This central portion 18 has apexially and circumferentially gathered and circumferentially disposed pleats 19 which generally are located on the inner side of the paper cup to form a relatively smooth bottom, the pleats 19 being separated from the pleats 14 by an annular depression 20. The bottom of the paper cup may be externally provided with suitable depressions for ornamental characteristics and for assisting in the disguising of the circumferentially arranged pleats.

The inner surface of the spoon serviceable bottom 14 is preferably concave, such as rounded, as illustrated, but of course it may be of any other desired shape.

The manner of forming the truncated conical single piece paper cup of this invention is illustrated in Figures 4 and 5. The paper cup is preferably formed from a conical paper cup as illustrated in Fig. 4, which cup has an apex 25. The apexial end of the conical paper cup is inverted into an internally located extension, as illustrated in Fig. 5. This internally located extension may be frusto-conical in configuration, as illustrated at 26, and may have a reentrant conical portion 27. The portion of the conical paper side wall adjacent the internally located extension is circumferentially gathered into the substantially transverse annular surface 15 having the substantially radially disposed pleats 16. The internally located extension is then compressed into the substantially transverse surface 18 merging with the substantially transverse annular surface 15, as illustrated in Fig. 3.

Any suitable means may be utilized for so forming the conical paper cup of this invention. Of course, such a conical paper cup may be formed by hand. Figs. 6, 7 and 8 illustrate dies which may be utilized for performing the method on a commercially productive basis.

In Fig. 6 the conical paper cup may be placed over a male die 30 having a frusto-conical surface 31, a curved annular surface 32, and a central opening 33. A female die 34 has an internal frusto-conical surface 35 for holding the conical paper cup against the frusto-conical surface 31 of the male die 30. The female die 34 is provided with a central opening 36 for slidably receiving a plunger 37 which, in turn, is provided with a central conical opening 38. After the female die 34 has been operated to hold the conical paper cup on the male die 30, the plunger 37 is operated to carry the apexial end of the conical paper cup into the central opening 33 in the male die. In so doing the internally located extension having the frusto-conical portion 26 and the conical portion 27 is provided. At the same time the side wall of the conical paper cup is apexially and circumferentially gathered over the curved annular surface 32 and such gathering is afforded by the formation of substantially radially disposed pleats.

After the internally located extension is thus provided on the paper cup it is removed from the dies illustrated in Fig. 6 and may be applied to the dies illustrated in Fig. 7. A female die 40 of Fig. 7 is provided with an internal frusto-conical surface 41 terminating in a shoulder 43. A curved annular surface 42 lies between the shoulder 43 and a central recess 44. The die construction of Fig. 7 also uses a male die 45 having an external frusto-conical surface 46 terminating in a ledge 47. A curved surface 48 lies between the ledge 47 and a central opening 49. The plunger 50 is slidably received in the central opening 49. The paper cup having the internally located extension is inserted in the female die 40 and is held in place therein by the male die 45 through the interaction of the frusto-conical surfaces 41 and 46. The surfaces 43 and 47 form

the offset 17 in the paper cup and the surfaces 42 and 48 form the pleated annular portion of the spoon serviceable bottom. The internally located extension of the paper cup is received in the central opening 49 of the male die. The plunger 50 is then advanced and in so doing it compresses the internally located extension into the centrally located pocket 44 to form the substantially transverse surface 18 merging with the substantially transverse annular surface 15 of the paper cup. When the internally located extension is thus compressed the paper thereof is pleated into substantially circumferentially arranged pleats.

In order to finally finish the spoon serviceable bottom the paper cup may be removed from the dies of Fig. 7 and inserted in the dies of Fig. 8. In Fig. 8 a female die 55 is provided with a frusto-conical surface 56, a shoulder 58, a curved annular surface 57 and a transverse surface 59 having suitable raised portions for embossing the bottom of the paper cup. A male die 60 is provided with a frusto-conical surface 61 terminating in a ledge 62. The male die 60 is also provided with a central opening 63 for slidably receiving a plunger 64 having a curved surface 65 and a substantially transverse surface 66. The paper cup partially formed by the die structure of Fig. 7 is inserted in the die structure of Fig. 8 for finally pressing and forming. The coacting frusto-conical surfaces 56 and 61 hold the paper cup firmly in place and the shoulder 58 and ledge 62 finally form the offset 17. The coacting curved surfaces 57 and 65 press and finally form the annular portion 15 of the spoon serviceable bottom and likewise the surfaces 56 and 59 press and finally form the central portion 18 of the spoon serviceable bottom. The raised portions in the central surface 59 emboss the central portion 18 of the spoon serviceable bottom into the desired design.

When the internally located extension of the paper cup is compressed into the central portion 18 by the die structures of Figs. 7 and 8, the paper thereof is upset or swaged into the central bottom portion 18. This upsetting or swaging action operates to firmly compress and unite the paper fibers to form an extremely compact and solid spoon serviceable bottom.

Obviously the sizes and shapes of the dies may be varied to produce different sizes and shapes of paper cups. In accordance with the method of this invention large amounts of paper at the apexial end of the conical paper side wall may be uniformly gathered, pleated and compressed into strong and neat appearing spoon serviceable bottoms of very large diameters or in paper cups of extremely small cone angles.

While for purposes of illustration one form of this invention has been disclosed, other forms thereof may become apparent to those skilled in the art upon reference to this disclosure and, therefore, this invention is to be limited only by the scope of the appended claim.

We claim as our invention:

A truncated conical single piece paper cup of less than sixty degree cone angle comprising a substantially smooth frusto-conical side wall having a cone angle of less than sixty degrees, and a substantially transverse spoon serviceable pleated bottom merging with the smaller diameter end of the side wall, said spoon serviceable bottom having an outer annular portion, which merges with the side wall, provided with substantially radially disposed pleats and a central circular portion, which merges with the annular portion, provided with substantially circumferentially disposed pleats.

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