April 2, 1963 W. L. MILLER 3,083,888

COMPOSITE CUP AND BOTTOM THEREFOR

Filed Dec. 6, 1957 3 Sheets-Sheet 1

FIG. 1

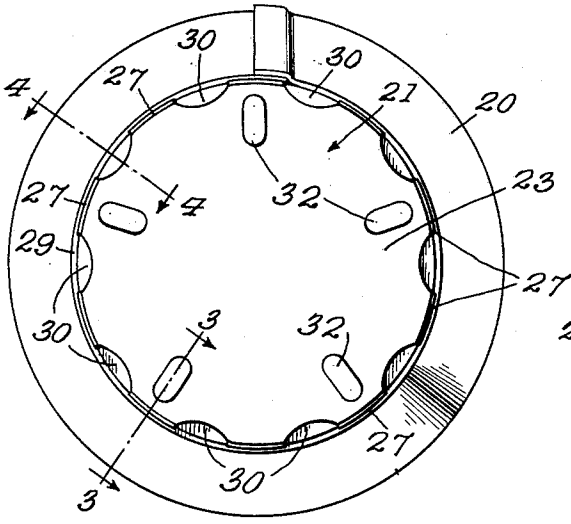


FIG. 3

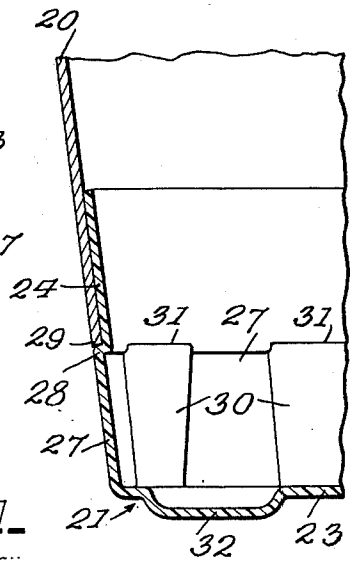


FIG. 17

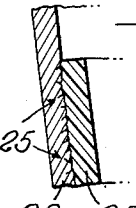


FIG. 2

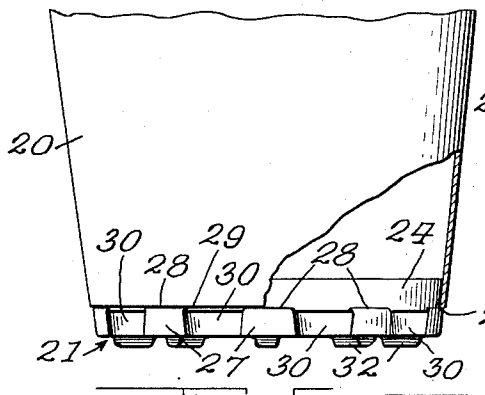


FIG. 4

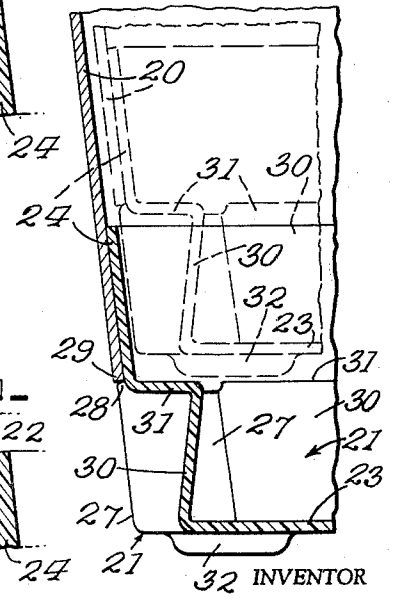


FIG. 5

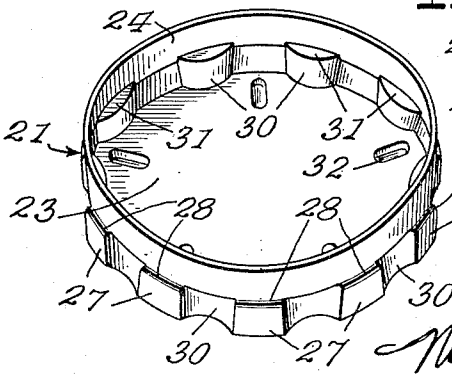
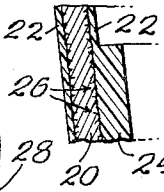


FIG. 18



INVENTOR
W. L. Miller

BY Mason, Portie, Miller & Stewart
ATTORNEYS

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FIG. 6

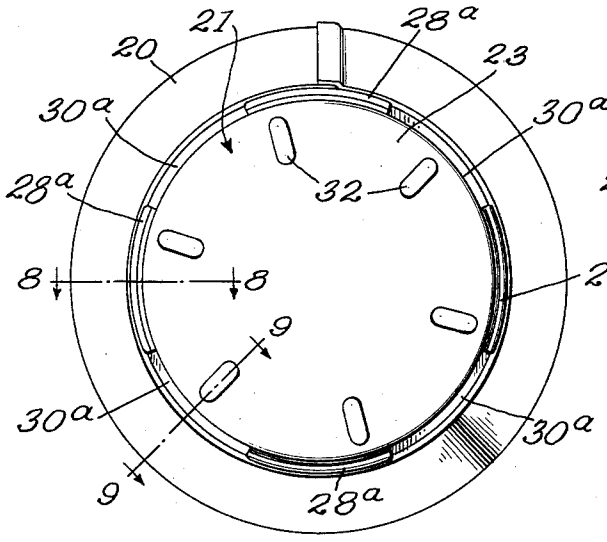


FIG. 8

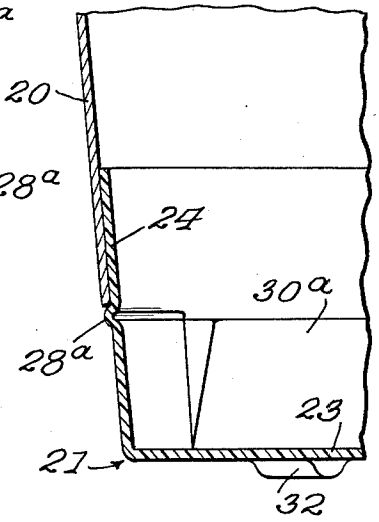


FIG. 7

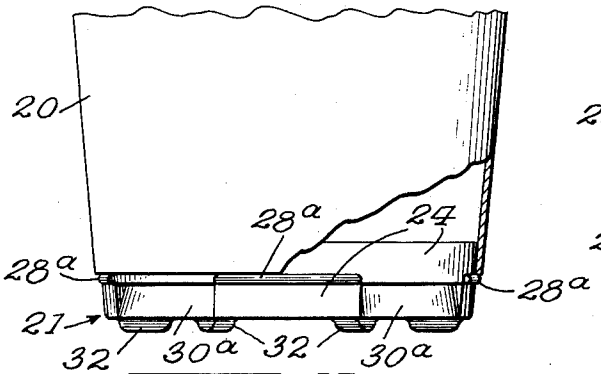


FIG. 9

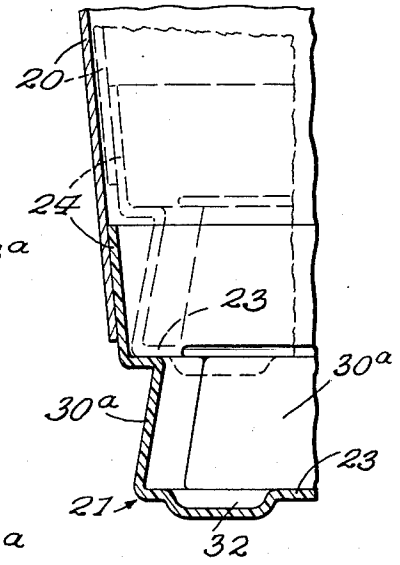
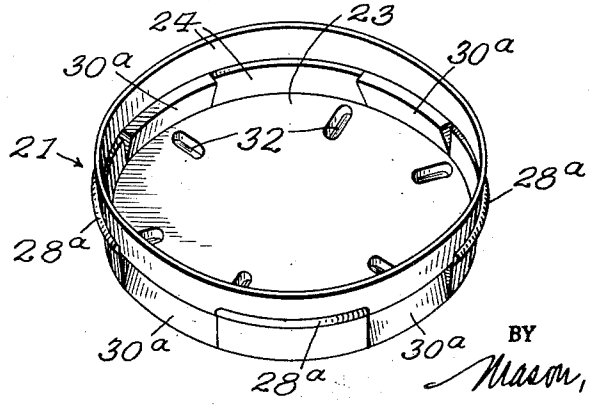


FIG. 10



INVENTOR

W. L. Miller

BY Mason, Porter, Miller & Stewart

ATTORNEYS

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FIG. 11

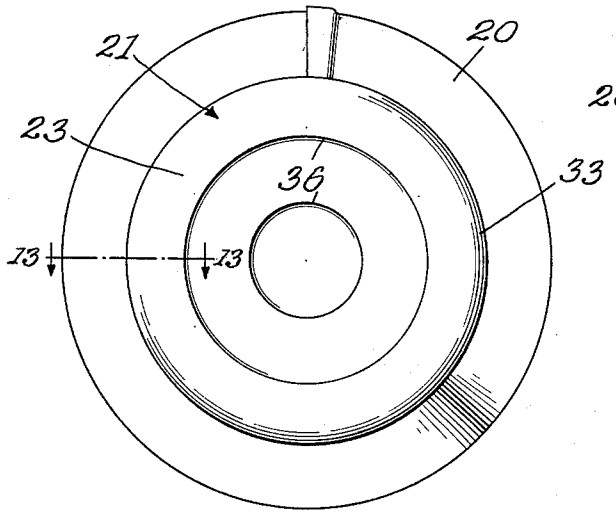


FIG. 13

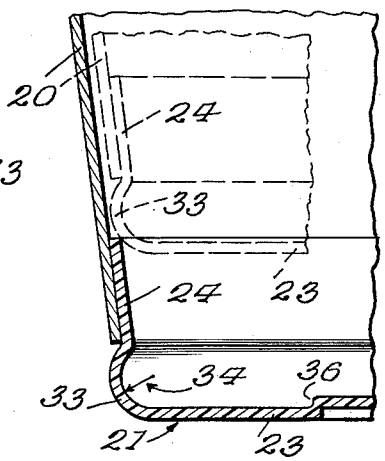


FIG. 12

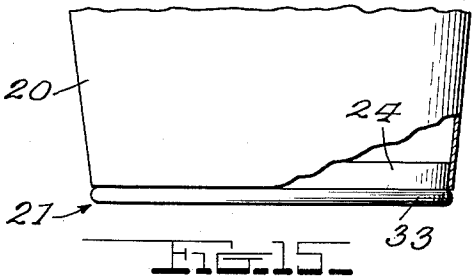


FIG. 14

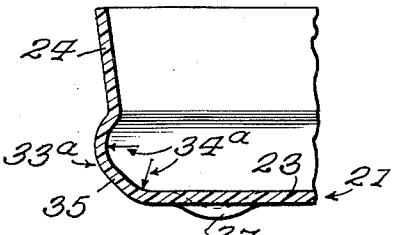


FIG. 15

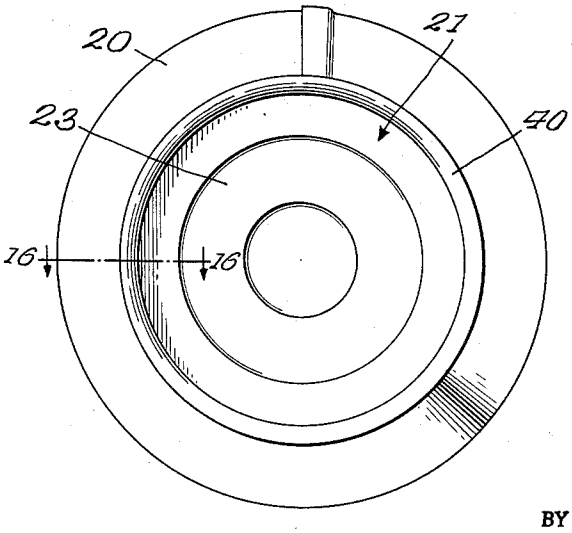
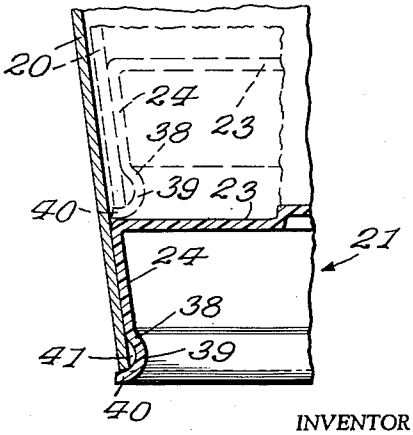


FIG. 16



INVENTOR

W. L. Miller

BY

Mason, Porter, Diller & Stewart

ATTORNEYS

United States Patent Office 3,083,888 Patented Apr. 2, 1963

3,083,888

COMPOSITE CUP AND BOTTOM THEREFOR

William L. Miller, Kensington, Conn., assignor to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Filed Dec. 6, 1957, Ser. No. 701,160
12 Claims. (Cl. 229—1.5)

In the manufacture of paper cups, a great deal of difficulty has been experienced in producing a good quality paper bottom and affixing it within the paper side wall in such a way as to produce a leak-proof article: and to date, the desired perfection has not been attained. Such paper cups usually have an adhesively secured rolled seam uniting the paper bottom with the paper side wall, but the mechanism for rolling the bottom and side wall together is rather unsatisfactory and many years of engineering have not resulted in bringing this mechanism to a state of substantial perfection.

Under one conventional procedure, the paper side wall is pre-formed into downwardly tapered shape and a downwardly flanged paper bottom is formed by die-forcing a paper disk through a forming die. Adhesive is applied to the inner side of the side wall at its lower end, the flanged bottom is downwardly forced within the side wall, and the lower end of the latter is then rolled inwardly under the bottom flange and upwardly against the inner side of this flange. However, the bottom flange cannot be given any downward taper by the forming dies and in fact usually springs out into more or less irregular downwardly flared form. The result is that the lower edge of this flange scrapes off a great deal of the adhesive from the paper side wall during assembly of this wall with the bottom. Moreover, the bottom flange, even though it may be forced into conformity with the taper of the side wall during rolling of the seam, has a tendency to immediately spring back from the side wall as soon as the rolling operation is terminated. These factors, plus the inevitable creeping of the paper flange during rolling, have been serious contributors toward the production of faulty articles and the necessity of discarding a great many as waste.

Under another conventional procedure, a flat side wall blank is curved around and adhesively secured to the flanged bottom, and the blank ends are then secured together, the seam being then completed by rolling as above explained. While this procedure is free from the adhesive scraping drawback above mentioned, it is not free from others and is very difficult to satisfactorily perform.

For such reasons, the industry has become resigned to the inevitability of a rather formidable percentage of faulty paper cups and consequent waste. The present invention, however, has aimed to overcome prior difficulties by abandoning the use of a paper bottom and providing a pre-formed, shape-retaining, plastic bottom disk having an integral peripheral flange to be secured against a paper side wall. Not only does such a construction require no rolled seam, but the plastic flange may be at a fixed angle to the plastic bottom disk, said angle being identical with the angle which is to exist between said bottom disk and the paper side wall. Thus, the flange cannot become downwardly flared, no reshaping of said flange is necessary, and a more perfect union of bottom and side wall may be attained.

In carrying out the above end, another object has been to provide a novel construction in which the flange is externally shouldered to abut the lower edge of the paper side wall, to relatively position the plastic bottom and paper wall during assembly and to protect said lower edge of said paper wall.

Yet another object has been to internally shoulder

the flange to support a nested cup in such manner that the cups cannot become frictionally wedged together.

A further object has been to provide a novel construction in which the plastic flange is self-adhered to a paper side wall and is provided with integral minute projections permeating pores of the paper.

A still further object has been to provide a novel construction in which the integral flange of the plastic bottom disk is integrally joined to a plastic coating on the paper side wall.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a bottom view of one form of the composite cup.

FIGURE 2 is a fragmentary side elevation, partly in section, showing the same form of cup.

FIGURES 3 and 4 are enlarged detail radial sectional views on lines **3—3** and **4—4** of FIGURE 1, a nested cup being shown in broken lines in FIGURE 4.

FIGURE 5 is a perspective view of the plastic cup bottom of FIGURES 1 to 4.

FIGURES 6 to 10 are views corresponding to FIGURES 1 to 5 but showing a different form of construction.

FIGURE 11 is a bottom view showing another form of construction.

FIGURE 12 is a fragmentary side view, partly in section, showing the cup of FIGURE 11.

FIGURE 13 is an enlarged detail radial section on line **13** of FIGURE 11, a nested cup being shown in broken lines.

FIGURE 14 is an enlarged detail radial section showing a plastic cup bottom slightly different from that of FIGURE 13.

FIGURE 15 is a bottom view showing another form of construction.

FIGURE 16 is an enlarged detail radial section on line **16—16** of FIGURE 15, a nested cup being shown in broken lines.

FIGURE 17 is an enlarged detail radial section showing one manner of securing the flange of the plastic bottom to the paper side wall.

FIGURE 18 is a view similar to FIGURE 17 showing another way of securing the flange and side wall together.

In all forms of the invention, a paper side wall **20** is fluid tightly secured to a plastic bottom member generally designated **21**.

The paper wall **20** may be coated or uncoated but in FIGURE 18 is shown as provided on each side with a plastic coating **22**. The plastic bottom member **21** may be of styrene or other suitable plastic formed into desired shape by any suitable method, for example, by injection molding or vacuum forming.

Each form of the plastic bottom member **21** comprises a disk **23** having a continuous peripheral flange **24** integral therewith. The disk **23** and flange **24** constitute a pre-shaped form-retaining unit in which the angular relation of said flange **24** to said disk **23** is identical with the angular relation to exist between said disk and the paper side wall **20** in the completed cup. For example, if the side wall **20** is to have a taper of say 6°, the flange **24** will be pre-shaped with this same taper, allowing perfect mating of flange and side wall and facilitating union of the two.

By stating that the unit **23, 24** is form-retaining, it is not intended to give the impression that said unit is necessarily rigid but only that it possesses sufficient rigidity to retain its shape, which of course does not exclude suffi-

cient resiliency to avoid breakage. In fact, the unit is preferably resiliently yieldable.

In all disclosed forms of construction, the flange **24** fits within the lower end portion of the paper side wall **20** and is fluid tightly secured thereto. In all forms, except that shown in FIGURES 15 and 16, said flange **24** projects upwardly from the disk **23**. In FIGURES 15 and 16, the reverse is true. In each instance, the plastic flange **24** and paper side wall **20** may be fluid tightly secured together in any suitable way. An appropriate adhesive may be employed: or the outer periphery of the flange **24** may be converted to a tacky condition by applying a solvent thereto and the tackiness utilized to cause self-adherence of the flange to the paper wall (FIGURE 17). Also, when the paper wall **20** is plastic-coated (FIGURE 18) the plastic flange **24** may be integrally united with the innermost plastic coating **22** by heat-sealing or by the use of a solvent to convert the engaging portions of the two plastic elements to such condition that they will unite.

In FIGURE 17, in which the plastic flange **24** is self-adhered to the paper wall **20** due to the use of a solvent on said flange, the partly dissolved portion of said flange produced by the solvent not only adheres to the paper wall **20**, but permeates pores of the paper, providing the flange with a myriad of minute projections **25** interlocked with said pores, thereby insuring perfect union between the flange and wall. In FIGURE 18, an equally effective union exists as the plastic flange **24** becomes integrally united with the innermost plastic wall coating **22** and minute portions **26** of this coating permeate the pores of the paper wall **20**.

In FIGURES 1 to 5, substantially the lower half of the flange **24** is formed with slight, external, circumferentially spaced projections **27** providing upwardly facing shoulders **28** underlying and contacting with the lower edge **29** of the paper side wall **20**. These shoulders relatively position the plastic bottom member **21** and the paper side wall **20** during assembly and the projections **27** protect the lower edge of said side wall in the complete article.

Between the external projections **27** (FIGURES 1 to 5) the flange **24** is formed with inwardly deformed portions **30** providing internal upwardly facing shoulders **31** to support a nested cup and prevent the two cups from becoming tightly wedged together.

In FIGURES 6 to 10, the flange **24** is formed with circumferentially spaced external ribs **28***a* and between said ribs with inwardly deformed portions **30***a*. The ribs **28***a* and portions **30***a* perform the same functions as the shoulders **28** and projections **30** of FIGURES 1 to 5, respectively.

In the forms of construction shown in FIGURES 1 to 5 and FIGURES 6 to 10, the plastic bottom disk **23** is formed with depressed feet or rests **32**.

In FIGURES 11 to 13, the flange **24** is provided with an external bead **33** at its juncture with the disk **23**, to abut and protect the lower edge of the paper side wall **20**. This bead is formed on a single radius **34**. When two cups are nested (FIGURE 13) the bead **33** of the inner cup rests on the flange **24** of the outer cup and wedging of the cups together, is prevented.

In FIGURE 14, the bead **33***a*, having the same functions as the bead **33**, is formed by two radii **34***a* joined by an inclination **35**.

The bottom disk **23** in FIGURES 11 to 13 is shown of stepped form at **36** and the corresponding disk of FIGURE 14 is shown as having feet or rests **37**.

In FIGURES 15 and 16, in which the flange **24** projects downwardly from the disk **23**, the lower edge of this flange is curved inwardly at **38**, then downwardly at **39** and finally outwardly at **40** under the lower edge of the paper side wall **20**. This not only protects the wall edge but provides a pocket **41** between the flange **24** and the paper wall **20**. When an adhesive is employed in securing the bottom member **21** to the wall **20**, this pocket will receive some of said adhesive to insure a stronger union of flange **24** and side wall **20**.

When two cups are nested as in FIGURE 16, the flange **40** of the inner cup rests on the disk **23** of the outer cup and the two side walls are then out of wedging contact with each other.

From the foregoing, it will be seen that novel and advantageous provision has been disclosed for overcoming difficulties experienced in the manufacture of paper cups. While preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

1. A composite cup comprising a thin flexible paper side wall of a thickness customarily found in paper drinking cups, and a flexible plastic bottom disk of generally the same thickness as said side wall, said bottom disk having a smooth integral continuous peripheral flange, said paper side wall having a smooth lower peripheral surface disposed concentric with and fluid tightly bonded to said bottom disk flange, said flange being externally shouldered under and in contact with the lower edge of said paper side wall.

2. A composite cup comprising a thin flexible paper side wall of a thickness customarily found in paper drinking cups, and a flexible plastic bottom disk of generally the same thickness as said side wall, said bottom disk having a smooth integral continuous peripheral flange, said paper side wall having a smooth lower peripheral surface disposed concentric with and fluid tightly bonded to said bottom disk flange, in which said bottom disk is disposed in a plane spaced downwardly from the lower edge of said paper side wall to expose the lower portion of said flange, said exposed lower portion of said flange being externally shouldered under and in contact with said lower edge of said paper side wall.

3. A composite cup comprising a thin flexible paper side wall of a thickness customarily found in paper drinking cups, and a flexible plastic bottom disk of generally the same thickness as said side wall, said bottom disk having a smooth integral continuous peripheral flange, said paper side wall having a smooth lower peripheral surface disposed concentric with and fluid tightly bonded to said bottom disk flange, in which said bottom disk is disposed in a plane spaced downwardly from the lower edge of said paper side wall to expose the lower portion of said flange, said exposed lower portion of said flange being internally shouldered to support a like cup in nested relation.

4. A composite cup comprising a thin flexible paper side wall of a thickness customarily found in paper drinking cups, and a flexible plastic bottom disk of generally the same thickness as said side wall, said bottom disk having a smooth integral continuous peripheral flange, said paper side wall having a smooth lower peripheral surface disposed concentric with and fluid tightly bonded to said bottom disk flange, in which said bottom disk is disposed in a plane spaced downwardly from the lower edge of said paper side wall to expose the lower portion of said flange, said exposed lower portion of said flange having circumferentially spaced outwardly projecting portions underlying and contacting with said lower edge of said paper side wall, said exposed lower portion of said flange having inwardly projecting portions between said outwardly projecting portions and adapted to support a like cup in nested relation.

5. A composite cup comprising a thin flexible paper side wall of a thickness customarily found in paper drinking cups, and a flexible plastic bottom disk of generally the same thickness as said side wall, said bottom disk having a smooth integral continuous peripheral flange, said paper side wall having a smooth lower peripheral surface disposed concentric with and fluid tightly bonded to said bottom disk flange, in which said bottom disk is disposed in a plane spaced downwardly from the lower edge of said

paper side wall to expose the lower portion of said flange, said exposed lower portion of said flange having a continuous external bead underlying and contacting with said lower edge of said paper side wall, said paper side wall being longitudinally tapered with the lower end of a smaller diameter than the upper end, said bead being disposed at the juncture of said flange with said bottom disk, said flange having a portion terminating upwardly of said bead and adapted to support a like cup in nested relation.

6. A composite cup comprising a paper side wall having a downwardly facing lower edge, and a plastic bottom disk surrounded by said paper side wall and spaced upwardly from said downwardly facing lower edge thereof, said plastic bottom disk having an integral continuous flange projecting downwardly therefrom and adhesively bonded fluid tightly against the inner peripheral surface of said paper side wall, the lower edge portion of said flange being turned inwardly, then downwardly and then outwardly under said lower edge of the paper side wall to protect this wall edge and to provide a pocket for the adhesive between said paper side wall and said turned portion of said flange.

7. A one-piece cup bottom for connection with a cup paper side wall, said cup bottom being preformed of a form-retaining flexible plastic and the material of said cup bottom being sheet-like and generally of a constant thickness, said cup bottom comprising a bottom disk having a continuous peripheral substantially vertical form-retaining flange adapted to be fluid tightly secured against one peripheral surface of the paper side wall, in which said flange projects upwardly from said disk, said flange being internally shouldered to support a bottom of a like cup in nested relation.

8. A one-piece cup bottom for connection with a cup paper side wall, said cup bottom being preformed of a form-retaining flexible plastic and the material of said cup bottom being sheet-like and generally of a constant thickness, said cup bottom comprising a bottom disk having a continuous peripheral substantially vertical form-retaining flange adapted to be fluid tightly secured against one peripheral surface of the paper side wall, in which said flange projects upwardly from said disk, said flange being provided with circumferentially spaced outwardly projecting portions to abut the lower edge of the paper side wall, said flange being provided between said outwardly projecting portions with inwardly projecting portions adapted to support a bottom of a like cup in nested relation.

9. A one-piece cup bottom for connection with a cup paper side wall, said cup bottom being preformed of a form-retaining flexible plastic and the material of said cup bottom being sheet-like and generally of a constant thickness, said cup bottom comprising a bottom disk having a continuous peripheral substantially vertical form-retaining flange adapted to be fluid tightly secured against one peripheral surface of the paper side wall, in which said

flange projects downwardly from said disk, the lower edge portion of said flange being turned inwardly, then downwardly and then outwardly to underlie the lower edge of the paper side wall and to provide an adhesive receiving pocket between this wall and said turned edge portion of said flange.

10. A composite container comprising a paper side wall and a plastic bottom disk, said bottom disk having an integral continuous peripheral flange, said flange being secured to the lower portion of said paper side wall, said bottom disk being disposed in a plane spaced downwardly from the lower edge of said paper side wall to expose the lower portion of said flange, said exposed lower portion of said flange being internally shouldered to support a like cup in nested relation.

11. A composite container comprising a paper side wall and a plastic bottom disk having an integral continuous peripheral flange, said flange being secured to the lower portion of said paper side wall, said bottom disk being disposed in a plane spaced downwardly from the lower edge of said paper side wall to expose the lower portion of said flange, said exposed lower portion of said flange having circumferentially spaced outwardly projecting portions underlying and contacting with said lower edge of said paper side wall, said exposed lower portion of said flange having inwardly projecting portions between said outwardly projecting portions and adapted to support a like cup in nested relation.

12. A composite cup comprising a paper side wall, and a preformed plastic bottom disk having a continuous integral peripheral flange self-adhered to one peripheral surface of said paper side wall, said flange having integral minute projections permeating pores of said paper side wall, wherein the plastic bottom disk is formed of a hydrocarbon resin and said flange is provided with a solvent to obtain self-adhesion.

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