Sept. 10, 1957 R. E. SMUCKER 2,805,790

PLASTIC CONTAINERS AND PACKAGING THEREOF

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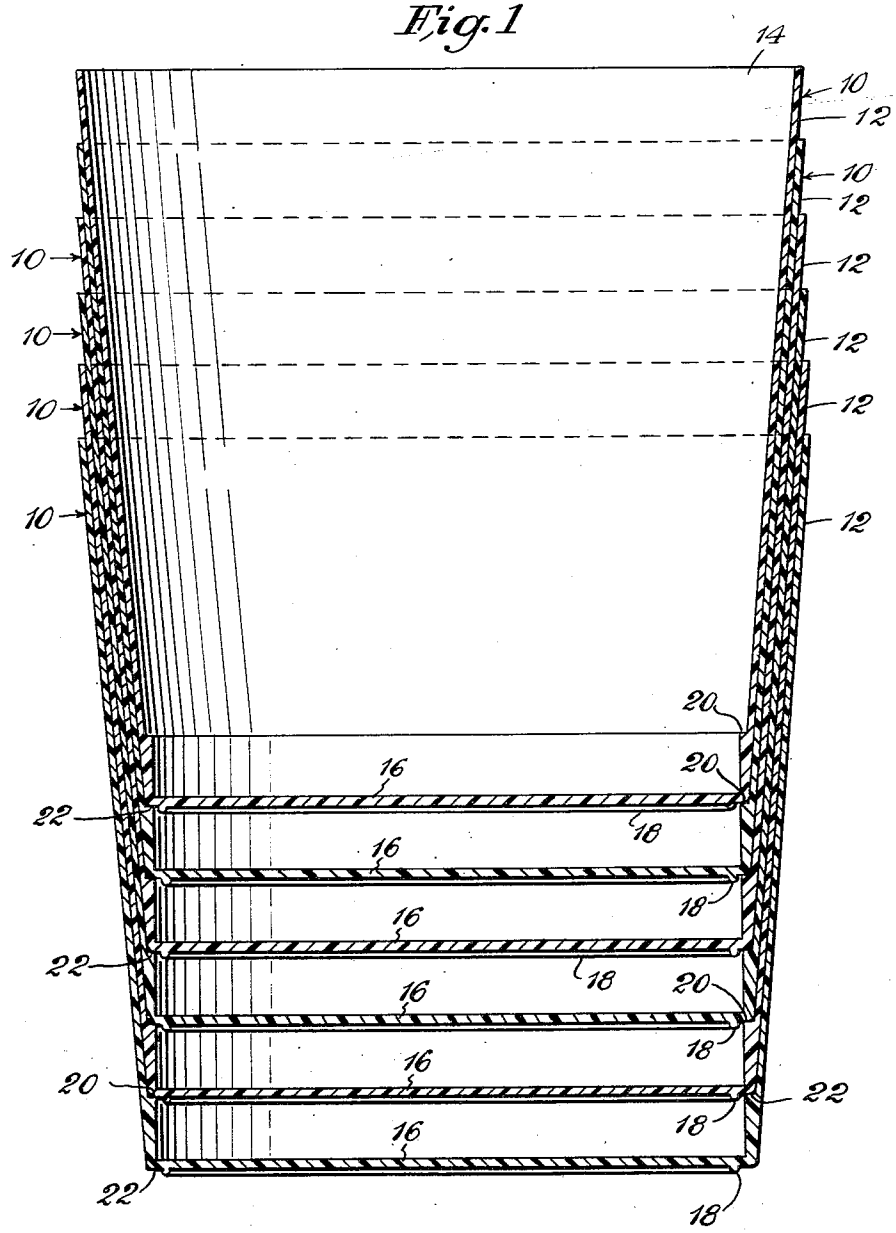
Fig. 1



Inventor
Robert E. Smucker

by Parker & Carter
Attorneys

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Fig. 3

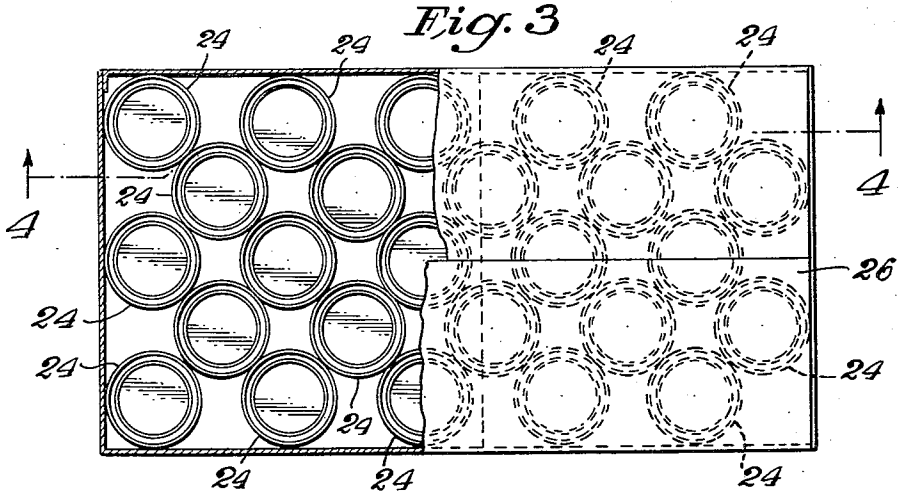
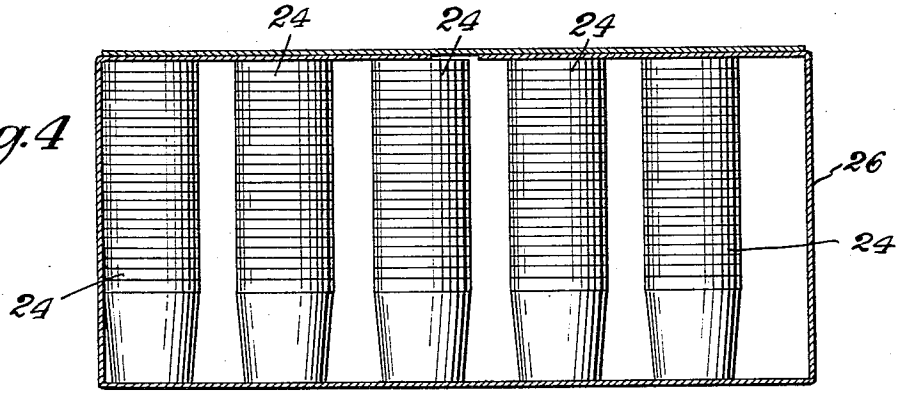


Fig. 4



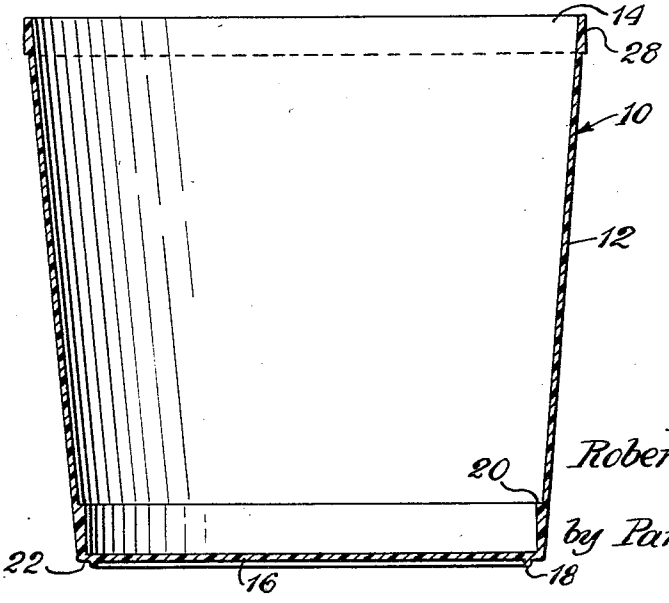


Fig. 2

Inventor
Robert E. Smucker
by Parker & Carter
Attorneys

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PLASTIC CONTAINERS AND PACKAGING THEREOF

Robert E. Smucker, Fort Worth, Tex., assignor to Crown Machine and Tool Company, Fort Worth, Tex., a corporation of Texas

Application August 24, 1954, Serial No. 451,801

2 Claims. (Cl. 220—97)

This invention is in the field of receptacles or containers of the cup type, although it is not necessarily limited in this respect, and it is a new and improved type of cup container specifically constructed to withstand the rough handling normally expected during shipment and storage.

A primary object of my invention is a cup-like container or vessel, which, when shipped in a group, stack or collection, is designed to nest or telescopically interfit so that it can be shipped in large numbers but in small bulk.

Another object is a container of the above type which, when nested in a stack, is constructed to withstand the axial or longitudinal compressive forces applied to it so that the sides will not split due to the outward flexure or expansion applied to the sides of each container in the stack.

Another object is a thin wall plastic molded cup or container of the above type which, when nested in a stack, will carry the compressive load through the small closed end or bottom by a special compressive load carrying structure and not through the sides of the container.

Another object is a stack of nested plastic containers of the above type which can easily withstand the compressive load placed upon it.

Another object of my invention is a molded thin wall plastic container of the above type which is constructed specifically for shipment and storage in large quantities.

Other objects will appear from time to time in the ensuing specification and drawings in which:

Figure 1 is a vertical sectional view of a stack of my containers;

Figure 2 is a vertical sectional view, similar to Figure 1 but on a reduced scale, of a variant single container;

Figure 3 is a top view, partly in section, of my containers stored in a suitable shipping box; and

Figure 4 is a sectional view taken along line 4—4 of Figure 3.

In Figure 1 I have shown a stack of nested containers or cups, each individual container being substantially identical with the others. One of the containers, designated generally at **10**, is shown in Figure 2 and has a frusto-conical shaped side wall **12** open at its large end at **14** and closed at the small end by a wall portion **16**. A supporting bead or rim **18** is provided on the outside of the bottom wall to support the cup when it is placed on a surface. It should be understood that this supporting bead can have any suitable configuration, such as radially extending ledges, or a pattern configuration, or any suitable design.

The container is made generally of plastic and has a very thin wall; for example, in the neighborhood of .020 inch. The material is relatively clear and transparent. The sides of the container diverge slightly at approximately a 5° angle and therefore containers of this type can be nested or stacked one inside the other as shown in Figure 1 so that they will occupy a minimum amount

of space during shipment and storage. Thus a large number of the containers can be grouped together in stacks and shipped with a substantial reduction in overall bulk.

Inside of each container, I provide an annular abutment or shoulder **20** which as shown in the drawings extends around the inside of the container. This shoulder is in the nature of a reinforced or thickened section in the wall of the cup. The shoulder is disposed to face away from the closed bottom toward the open end or towards the top of the container and is positioned relatively close to the bottom.

Thus when containers of this type are nested or stacked one inside the other the shoulder **20** on each container will engage the bottom of the cup that is placed inside of it as shown in Figure 1. The outside diameter of the bottom of each container lies generally between the inside and outside diameters of the shoulder so that one container will slide fully inside of the other. The shoulder of one cup will engage the outer peripheral edge **22** of the cup stacked inside of it.

It is also desirable that the supporting bead **18** on the bottom be disposed within the confines of the shoulder so that it does not touch the shoulder and prevent the containers from fully seating.

For shipment or storage, the containers may be stacked and disposed in a suitable shipping carton. For example in Figures 3 and 4, I have shown the containers in stacks **24** of twenty-five each with twenty-five stacks to a carton. The carton, designated generally at **26**, can be a suitable cardboard or wooden box of any conventional type. I have found that with previous types of plastic cups I could only pack twenty-five rows of **10** cup stacks which is a total of 250 plastic containers per shipping carton. With my new type of cup I can increase each stack, which means that I can ship 925 containers in a single carton without any breakage.

It will be realized that whereas I have described and illustrated a practical and operative device; nevertheless, many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I, therefore, wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing. For example, in Figure 2 a lip is provided around the rim of the container to prevent splitting by strengthening the edge.

The use, operation, and function of my invention are as follows:

I provide a specific design or construction of cup having a very thin wall which at the same time is very durable and strong, and is made out of a transparent or clear plastic. Although it is not limited to this respect to a particular plastic, a plastic is best for my purposes. During shipment the cups are nested or stacked one inside the other and the outwardly facing abutment or shoulder near the bottom of each cup engages the bottom of the next adjacent cup so that in effect the cups as stacked rest entirely upon these shoulders. Thus, any compression loads on a stack of containers will be transmitted through the shoulders and not through the sides of the cup. Thus, although the sides slightly engage each other, nevertheless they will not be flexed outwardly or expanded. I have found that if the cups are stacked so that the load is carried by the sides, 10% to 15% breakage due to splitting of the sides of the cups will occur when they are shipped in large quantities. It is important that the bottom of each cup engage the shoulder in the next cup so that the compressive force will be carried through the shoulders and not through the sides of the cup. For this reason, the outside diameter of the bottom of each cup should lie between the inside and outside

diameters of the shoulder. If the outside diameter were larger, the bottom of one cup would not engage the shoulder of the next. If the inside diameter were smaller, the bottom of one cup would slide inside the shoulder of the other and the sides of each cup would be flexed outwardly and would probably split.

I have stated that the cups are made of plastic and of course this material is in general use at the present time. I have found that I can use a plastic to materially reduce the thickness of the walls of the cup and at the same time the weight will be substantially reduced. But plastic has a certain progressive splitting or tearing characteristic such that when it has started splitting, it will be greatly accelerated by any compressive forces. The same is true of an expanding force. By the provision of the annular shoulder in the bottom of each cup near the bottom, the compressive force will be transmitted actually from one shoulder to another and the sides will not be flexed outwardly. Only the topmost cup in a stack will have a compressive force applied through its walls, and breakage will be materially reduced if not completely eliminated. Thus, this shoulder in effect protects the thin walls of each cup. At the same time, the shoulder does not increase the spacing of the cups as it is so positioned near the bottom that the shoulder of one cup contacts the bottom of the next just before the telescoping walls of the two containers engage each other firmly. I have found that the shoulder in each cup should be high enough so that a slight clearance exists between the walls of the cups. If the walls engage each other, the cups will be difficult to separate because a slight closed vacuum will be present in the bottom of each cup. It should be understood that cups of this type are intended to be used with automatic filling equipment. Therefore, it is very desirable, if not absolutely necessary, that the cups be easily separated so that stacks of cups can be handled by automatic filling equipment. If a slight vacuum exists between the cups, they can not be used with automatic filling equipment lest it should hinder the operation of such equipment.

I have shown a lip **28** in Figure 2 and it should be understood that this can be used in the cups in Figure 1.

The provision of the lip around the top of the cup, as in Figure 2, in addition to strengthening the rim also enables a polyethylene cap to be used on the cup after it is filled.

The shoulder in the bottom of each cup has three functions: first, it prevents the formation of a vacuum; second, it prevents splitting of the sides of the cups; third, it strengthens the bottom of the cup.

While I have shown and described a preferred form of my invention, it should be understood that many changes, alterations and substitutions can be made. For example, the shoulder **20** need not necessarily be continuous, and in the claims it should be understood that the term "shoulder" or "abutment" does not necessarily mean a continuous rim although I have found that a continuous rim is the easiest to manufacture. I therefore wish that my invention be unrestricted except as by the appended claims.

I claim:

1. A cuplike, thin walled, completely integral, frusto conical container formed of a molded plastic material, and having a frusto conical thin side wall surface open at its large end and closed at its small end by an integral lateral bottom wall, the side wall terminating at the point of junction with the bottom wall, and a continuous integral thickened portion extending inwardly from the side wall adjacent and integral with the bottom wall at the point of junction between the side and bottom walls and extending in a radial direction from one surface of the side wall, the outer surface of the side wall being uninterrupted and smooth opposite the thickened portion, the thickened portion having a longitudinal inner surface which is substantially cylindrical and concentric with the axis of the container, the upper surface of the thickened portion facing outwardly and lying in a lateral plane generally perpendicular to the axis of the container and constituting a continuous annular shoulder adapted to engage an annular marginal portion of the bottom wall of a nested container of like size and shape, the axial dimension of the integral thickened portion from the inner surface of the bottom wall to the edge of the continuous annular shoulder being limited, such that the side walls of such containers, when nested, will be slightly separated due to engagement between the thickened portions to prevent the formation of a vacuum, the diameter of the outer surface of the bottom wall being less than the outside diameter of the continuous annular shoulder, measured at its point of junction with the inner surface of the side wall, but greater than the diameter of the longitudinal inner surface of the thickened portion, the thickened portion being integral with the side wall throughout the thickened portion's entire axial and circumferential extent, the integral thickened portions of a nested stack of such containers constituting, as a group, a substantially vertical supporting column constructed to pass axial loads directly from one thickened portion to another through the engaged annular marginal portion of each bottom wall.

2. The structure of claim 1 further characterized in that the thickness of the side wall of the frusto conical container is on the order of .020".

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