

Dec. 28, 1943.

A. M. BOOTHBY

2,337,865

CONTAINER MADE OF PAPER

Filed May 7, 1942

2 Sheets-Sheet 1

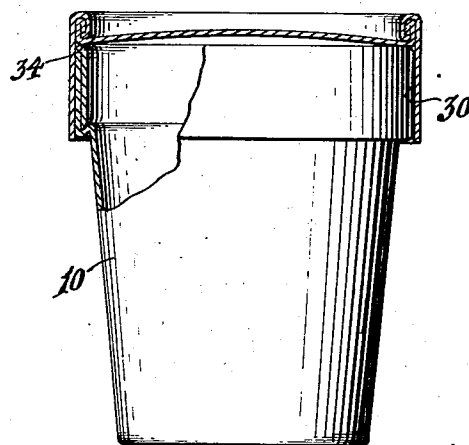
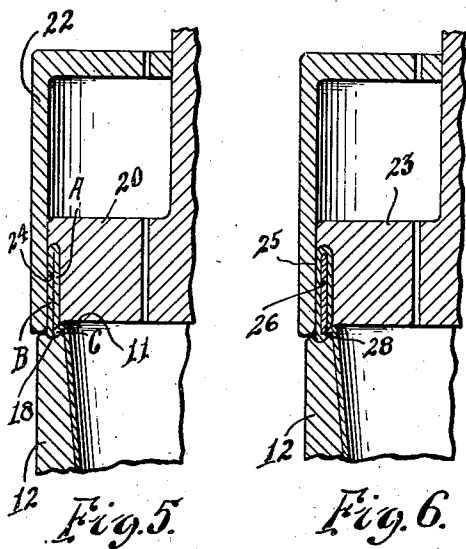
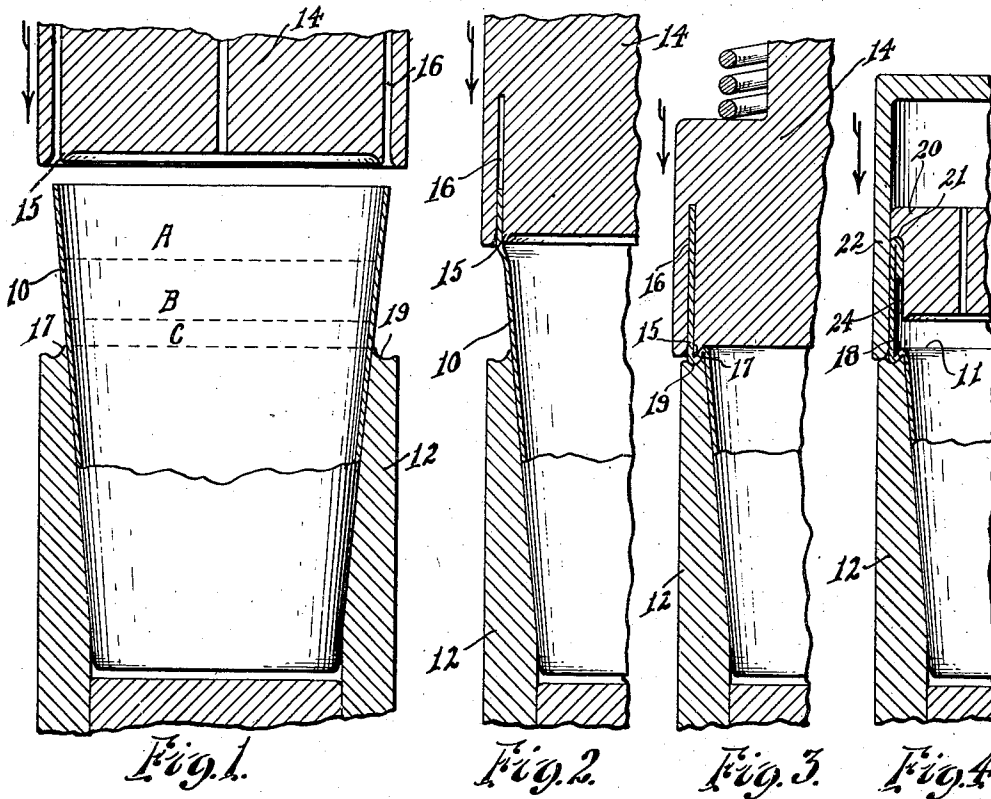


Fig. 7. Inventor
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2 Sheets-Sheet 2

Fig. 8.

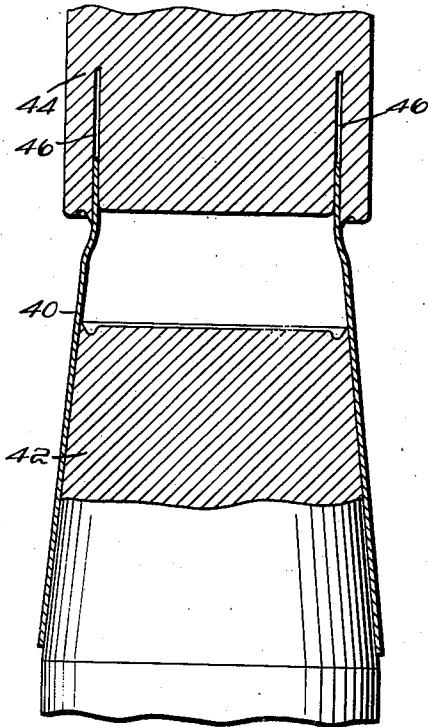


Fig. 9.

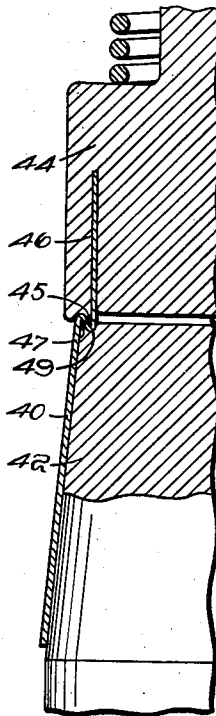


Fig. 10.

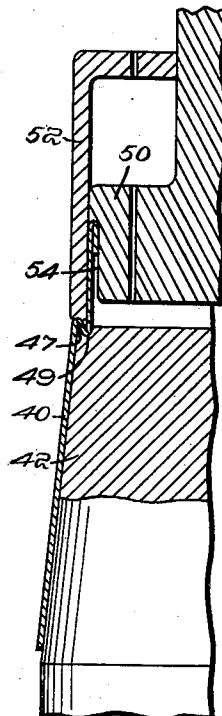


Fig. 11.

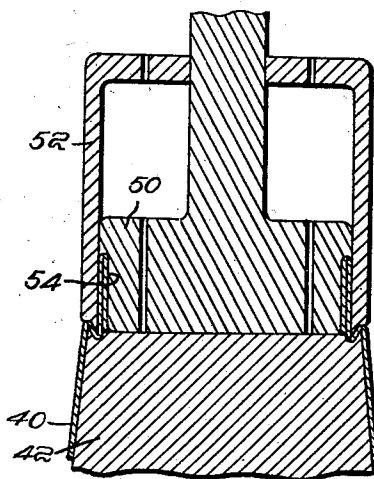


Fig. 12.

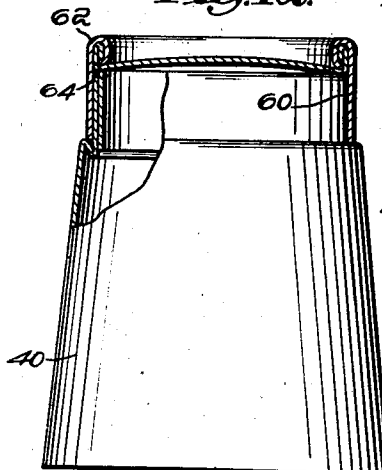


Fig. 13.



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UNITED STATES PATENT OFFICE

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CONTAINER MADE OF PAPER

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7 Claims. (Cl. 229—4.5)

This invention relates to containers made of paper.

More particularly it relates to paper cans such as are used for retail sales and servings of moist and liquid foods, as coffee, ice cream, milk, cottage cheese, or oysters; or, in suitable sizes, may be used to hold other liquid or solid substances.

Cans of the tapered body type have the important advantage over cylindrical cans that, before they are put to use, they can be nested together, to save space in shipment and in storage. But the attaining of this benefit has hitherto involved sacrifice of some or other of the properties that are important for a satisfactory use of the can.

One defect prominent in tapered-body containers has been a lack of rigidity in the top rim. A person grasping such a cup containing hot coffee sometimes collapses the top, and so slops some of the contents over her clothing.

When the cup is merely to be filled, to be carried away, this danger can be reduced by closing the top of the cup with a plane disk, sprung into a groove. But the service personnel in retail establishments often lack the skill to snap the disk into place accurately. Pressure unevenly applied tilts the disk and sticks fingers into the food. Or, if the cup happens unintentionally to be filled above the groove, the springing of the closure disk to its seat results in a slopping over of contents. Or, excess of caution under the usual hurried conditions of service may result in an under-filling, which is objectionable where a specified measure of contents is to be sold.

Another defect is that the edge of an interior closure disk has to fit very tightly and exactly in a perfect circle, in order to make a tight closure. Unskilful manipulation leaves a leaky top.

But the applying of a cylindrical flanged cover exteriorly of a cylindrical rim can be satisfactory, and under proper conditions can easily make a firm, tight closure.

Doubling the thickness of the top portion by turning the top of the body inward has also been tried, but this leaves a loose flap which both fails to afford desired firmness, and interferes with use by entrapping contents when the can is being emptied.

It is a purpose of the present invention both to avoid these and other faults that have characterized tapered containers as heretofore made, and, at the same time, to provide a tapered container which is capable of satisfactory all-around utility, in the various functions which such containers are desired to serve.

One feature is that the invention makes the top part of the tapered body into a rigid rim which is sufficient for ordinary uses. Another is that this rim can be made with reinforcement for even greater firmness if desired, as in cases where thin stock is used.

Also, it makes the rim so that exteriorly it can be fitted closely and deeply by a cover having a cylindrical flange, to make a tight top closure. A container thus made can measure and deliver its standard capacity by being filled to the top level and then closed with the exterior flanged cap—without embarrassment or leakage in the hurry of service conditions.

The rigidity is produced by the main part of the rim having a double thickness of stock, and having quadruple thickness at the base of the rim. This permits of thinner and less expensive paper stock being employed.

If the rigidity wanted is greater than the thin stock affords, or if an extra rigidity is desired, the invention provides for the said double thickness to house a reinforcing band which may be as stiff as may be desired.

Nested containers at present in the market are mostly of single-ply stock, and are too flimsy for general use. It is a further advantage of the present invention that if greater rigidity of body than single-ply stock will afford is wanted, nested containers having rims of the present invention can be made of sheet stock having two or several plies of paper, laminated with suitable adhesive.

The process for manufacture of the improved container has the further feature that it preserves the natural elasticity of the paper, the micro-structure of which is not disturbed seriously, as that structure is by those types of containers in which the top edge of the blank is spun outward with incidental stretching, and then is turned inward leaving the fibres loosened and the stock softened.

The invention thus provides a can which is useful, both when closed and when open, for sales and servings of food; and which, before being used, can be held nested in supply. When used it can be filled flush to the very top; it has tightness of closure, because a cylindrical cap can be used; it has firmness to resist deformation of its circular top by a person grasping it, or to resist the manipulation of one who may be filling it with stiff contents, as ice cream from a scoop; and it has a commercially valuable eye appeal, in that its top is in harmony with its body in exterior aspect.

It is, moreover, an important feature that my improved containers can be produced rapidly at costs comparable with the costs of current constructions of containers to which they are superior.

The tapered body blank to which the invention is applied may be made of any suitable sheet material, of paper or other stock substance, and by any suitable method. The invention is herein illustratively described as it may be applied to a tapered body blank made by cutting a flat blank from a flat paper sheet and wrapping it into the shape of a tubular conical frustum. Procedure for this is well known for producing length and diameter with precision from paper stock whose stiffness may be selected. The small end of the tube may be closed by any suitable permanent closure means.

According to the invention, the upmost circular zone A of such a conical blank of paper stock ultimately becomes an interior band in the rim of the completed container; and the second zone B becomes an outer band of the same. These two thicknesses overlies each other in the rim, the outer B being slightly stretched from its initial position and condition in the blank, and the inner A being slightly compacted, having initially been larger than B. The third zone C becomes molded into an ogee curve, set radially outward from the axis with its portion which is radially outmost concave upward and constituting a channel into which the lower edge of the inner band A is tucked and by which that edge is covered and is permanently held.

The opposing resilient reactions of the slightly stretched and the slightly compacted zones of the stock press these two bands together to constitute a rim of double thickness, upstanding from a base or bottom having quadruple thickness where the ogee locks and covers the inturned edge in a formation which favors complete drainage of contents when the can is inverted.

In the process for attaining this construction, zones A and B of the tapering tube blank are first to be expanded, so that they become a cylinder of the diameter possessed initially by the extreme top edge. The expanded area has a vertical depth slightly more than twice the depth desired for the ultimate cylindrical rim. This cylindrical expanded section is then to be thrust bodily downward, in the axial direction, around the adjacent top of the region that is not expanded, thus shaping the zone C with reverse curves that make the ogee. The stock of the top zone A is then to be spun inward and gradually downward until its edge that was at the top becomes tucked downward into that curve of the ogee which is concave upward. Said curve constitutes a channel which houses said edge. At the junction, of this double-thick cylindrical band with the single-thick unexpanded tapering portion of the wall of the body, the curve of the ogee which is convex upward constitutes an overlying lip which both serves as one wall of the channel, and, when contents are poured from the container, directs all outflowing contents of the can smoothly past the inturned edge of the original top zone A.

For providing greater stiffness of rim than would be made by the paper or other stock chosen for making the container, a cylindrical reinforcing of paper stock or of other material, having width approximating the desired ultimate depth of the cylindrical rim, may be inserted within the expanded B zone prior to the inturning of the A zone, so that the inturned A stock will be laid

inside of the insert. The channel having been made suitably wide, the insert and the turned-in A stock will then both be locked by the insertion of the inturned edge in the channel.

The cylindrical rim thus constituted, with or without the insert, can make a tight closure fit against the flange of a cap engaging exteriorly around the rim; is permanently stable; and can be stiff enough for all needs of users, whether for filling the container or for holding it normally and comfortably in hand.

In the accompanying drawings:

Figure 1 is an elevation, in medial vertical section, showing a tapering paper blank for a container body set in a stationary socket and about to have its upper region expanded by a forming plunger moving in axial direction;

Figure 2 is a similar view of a fragment of the same, showing the upper part of the tube at an intermediate stage of its being expanded to cylindricality;

Figure 3 is a view similar to Figure 2 showing completion of the expanding step, and illustrating how the final axial travel of the forming plunger cooperates with the mold on the top edge of the socket, to form an ogee curve integrally joining the cylindrical and the tapering portions of the tube walls;

Figure 4 is a similar view of the next stage, showing the expanded stock in process of being turned inward upon itself by another plunger;

Figure 5 is a similar view showing the rim completed, with the turned-in edge housed in the ogee curve;

Figure 6 is a view similar to Figure 5, but showing a reinforcing ring between the two thicknesses of the rim; and

Figure 7 is a side elevation partly in medial vertical section, of my improved container of Figure 5, covered by a flanged cap closure fitting thereon.

Figures 8, 9 and 10 are elevations, comparable respectively with Figures 2, 3 and 4 for showing successive steps in the application of the invention to the smaller end of a tapered paper container body mounted on a plug before the larger end is closed;

Figure 11 is an elevation, of the same at the moment of the completion of the forming of the double-thick cylindrical rim;

Figure 12 shows a cylindrical cap applied on the same; and

Figure 13 is an elevation of a fragment like Figure 12 except that at the edge of the rim the paper stock is doubled outward, instead of inward.

Referring to the drawings, the tapering tubular blank 10 may be a flat blank of paper or other sheet stock of desired stiffness and strength, preferably treated, as with paraffin, to make it resistant to moisture, which has been wrapped into the shape of a frustum of a cone; or this may have been otherwise made.

A permanent bottom closure of any conventional or other suitable type may be considered to have been formed or secured in the smaller end of the tube.

In Figure 1 the tube 10, with or without its bottom closure in place, is shown held in a tapering socket 12 adapted to hold the tube frictionally against rotation. The larger end of the tubular blank projects a substantial distance beyond the socket 12, for being expanded by a still or rotating plunger 14 as that plunger moves axially toward the socket. A very deep annular cylindrical groove 16 in the face of the plunger

is only a little wider than the thickness of the stock, and has a diameter such that it is adapted to receive the top edge of tube 10. As the plunger advances, upper zones A and B, of the tube, extending downward from the top edge, enter the groove and become expanded to cylindricality by the plunger, as shown in Figures 2 and 3. The circular underface of the plunger has a marginal ridge 15. As this ridge passes a cooperating ridge 17 of smaller diameter, on the top edge of the socket wall, the final travel of the plunger moves the whole expanded part A and B of the tube a little in axial direction, and bends a part of the zone C, next below B, outward and downward around that interior annular upstanding ridge 17, expanding and depressing what was the upper part of zone C so that it enters a marginal depression 19 which is in the top face of the socket wall outside of the ridge 17. This makes the zone C into an ogee curve, extending outward from the axis, in directions which may therefore be considered to have radial characteristics, this being an ogee reversely curved around the ridge 17 and the ridge 15, so that its curve 18 which is concave upward constitutes a groove or channel whose inner wall is the curve that is on that side of it which is toward the axis. The outer wall of this channel is the base of the expanded zone B. These reverse curves join the tapering part of the tube wall with the expanded part.

After this slight translating of the cylinder relative to the cone, the zone A of the cylinder is to be turned inward to lie within zone B of the cylinder and be secured there by the very top of the cone section. Figure 4 illustrates the tube held in a socket 12 which is being approached by a spinning plunger 20 that has initiated the inturning of the paper stock. Preferably a stationary circumferential wall 22 is first set down for exterior support of the expanded parts A and B of the tube walls, as in Figures 4 and 5. Then, as the plunger 20 moves axially toward the socket, the tubular stock enters the groove 24, whose walls are the plunger 20 and the wall 22. This is a U-groove whose curve 21 is on the margin of the plunger, and whose width slightly exceeds twice the thickness of the paper stock. The curve guides the edge of the tube through a bend of 180° and downward, to lay the stock of zone A inside of the stock of zone B, thus to provide a double thick cylinder upstanding above the ogee. The final travel of this plunger 20 tucks the annular inturned edge of the tube into the ogee's annular channel 18, as in Figure 5; and there that edge is housed and confined, being covered laterally by the ogee's convex curve 11 which constitutes an overlying interior lip and holds the tucked edge secure against displacement.

The double thick cylindrical stiffness thus provided can be increased by adding a reinforcing ring 26 shown in Figure 6. This can be preliminarily inserted in the expanded part of the tube. The inturning of tube walls in this case will occur inside of this ring, the margin of the plunger being made with suitable space, so that the ring stands as a reinforcement between the outer and inner thicknesses of the tube stock. In Figure 6 the plunger 23, with its wider groove 25, may drive both the lower edge of the ring insert and the turned-in edge of tube stock into the wider ogee channel 28, to secure them both against displacement.

While the principal use of the invention is expected to be for containers that can be nested together, in which case the open mouth is at the

larger end of the taper, the invention nevertheless has utility in containers tapering oppositely, toward a mouth at the smaller end. In such cases, illustrated in Figures 8-13, the rim-forming operations can be performed before the larger end is closed, the tapering blank 40 being mounted on a tapering plug 42; and the operations in general will embody reversals of details above described. That is, the effect of the deep cylindrical groove 46 in the forming plunger 44 will be to condense the fibres of the paper stock slightly. If the rim-doubling groove 54 between the spinning plunger 50 and stationary wall 52 is set in position to turn the edge of the paper 40 toward the axis, as in Figures 4 and 10, there will be a further slight condensing of the fibres, making the interior ply of the finished rim be extra stiff. The completing of the ogee base for such a rim is illustrated in Figure 9, where the ridge 45 of the descending plunger 44 has passed the marginal ridge 47 upstanding on the support, and has entered the circular groove 49 which lies in the top face of the support next inward from the ridge 47. If the rim-doubling groove, 54 in Figure 10, is to turn the edge of paper, 46 of Figure 9, outward from the axis, to the position shown in Figure 13, it is obvious that the groove will be set with slightly different radius, so that the upstanding edge 46 will enter along the groove wall which is nearer the axis; the ogee-forming ridges and grooves being made with radii that position them to cooperate so that the ogee will form on the outside of the cylindrical formation; and the doubling back of the edge will be on the outside. In this situation a top cover with close-fitting cylindrical flange can be used to enclose contents, with the edge of that cover flange pressed into and confined in the upward concavity of the ogee.

The invention thus provides a tapering container of either type with a strong cylindrical rim 30, 60 or 60' for easily receiving and tightly seating the flange of a cap cover 32, 62 or 62'. The exposed edge 34, 64 or 64' is smooth, by reason of the bend between the stock of zones B and A, which facilitates the putting on of a tightly fitting cap cover, and makes the edge agreeable to one's touch when the container is used as a cup for drinking. Although the drawings, for clarity, emphasize the vertical depth which the rim may have, that depth need not be so great. The stock of zone A being held both by its tucked-in edge and its bend at the rounded edge of the container, and being sustained by the quadruple-thick base, the depth can be as little as may be desired between these two said edges.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

I claim as my invention:

1. A tapering container, whose side walls comprise sheet stock which forms its tapering tubular body and a cylindrical mouth rim; the said stock in the rim being integral with stock in the tapering body, being connected thereto by an annular ogee curve of the sheet stock, and containing the marginal portion of the sheet of stock, said marginal portion being turned back at the mouth edge of the container as a doubling thickness of cylindrical rim wall; characterized by this, that the mutually reversed curves of the ogee are at a distance from the mouth edge of

the container and overlap each other, as viewed radially in a direction perpendicular to the axis of the cylindrical rim; and that that sheet stock which is in the rim and is adjoining the ogee rises cylindrically beyond the zone of the ogee curve through said distance to the edge of the container and returns thence cylindrically to the ogee, thus constituting said doubling thickness.

2. A tapering container as in claim 1, further characterized in that the mouth rim is at the larger end of the taper; and the cylindrical rim portion of the container stands in said distance from the ogee to the edge.

3. A tapering container as in claim 1, further characterized in that the mouth rim is at the smaller end of the taper and that the annular ogee curve proceeds toward the axis of the container from the tapering body; the turning back of sheet stock at the mouth edge of the container being a turning outward from the axis.

4. A tapering container as in claim 1, further characterized in that the cylindrical rim portion of the container stands in a position at which it is translated slightly in axial direction from its relation of directly continuing the taper of that part of the sheet stock which is in the tapering body portion, a shallow groove being thus provided, which is the said concavity of the ogee, sufficient to house the turned back edge.

5. A tapering container as in claim 1, further characterized in that a separate annular reinforcing body is housed between the two thicknesses of sheet stock of the cylindrical rim.

6. A tapering container, whose side walls comprise sheet stock which forms a tapering tubular body and a cylindrical mouth rim; said rim being integral with the tapering body, being connected thereto by an annular ogee curve of the sheet stock, and containing the marginal portion of the sheet stock, said marginal portion being turned back at the mouth edge of the container as a doubling thickness of cylindrical rim wall; characterized by this, that the mutually reversed curves of the ogee are at a distance from the mouth edge of the container and constitute a base from which the double thickness of stock is projected cylindrically through said distance to the mouth edge; the edge of the said turned-back stock being housed in that section of the ogee curve which is the more remote from the body taper; and the stock which is in the ogee curve plus that edge portion of turned back stock which is thus housed therein constituting a base for the projected double thickness, which base, in section, perpendicular to the axis, has quadruple thickness of stock.

7. A tapering container as in claim 1, further characterized in that that part of the sheet stock which returns from the edge of the container to the ogee has its edge housed in the upward concavity of the ogee and is laterally confined there by the upward convexity of the ogee.

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