Oct. 9, 1934. R. A. BENNETT 1,976,003

CONTAINER AND METHOD OF MAKING THE SAME

Filed Oct. 24, 1930

Fig. 1.

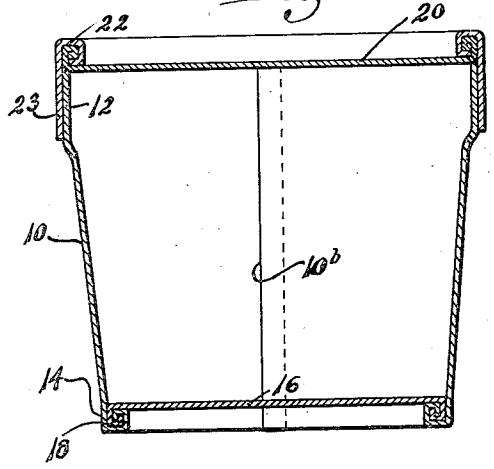


Fig. 4.

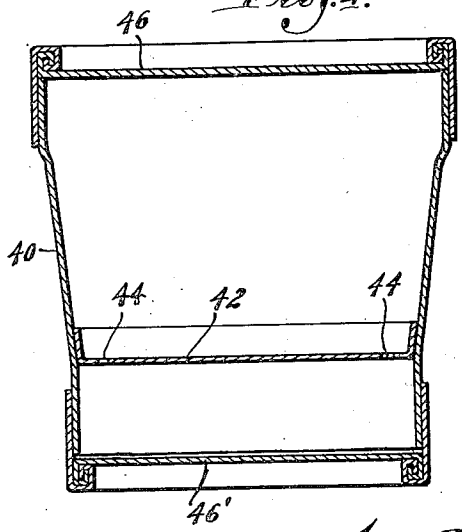


Fig. 2.

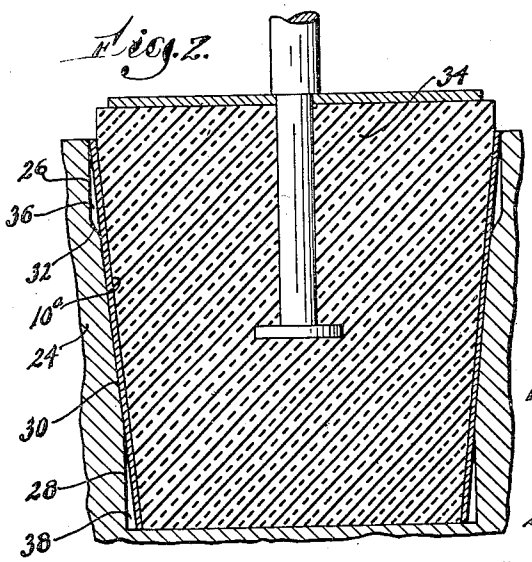


Fig. 3.

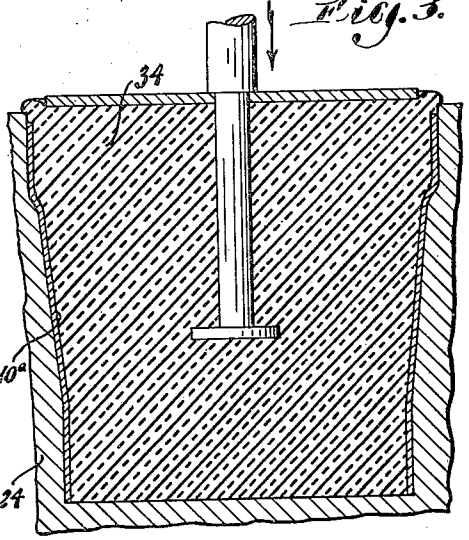
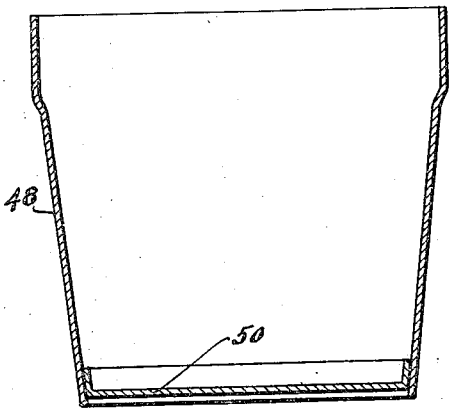


Fig. 5.



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UNITED STATES PATENT OFFICE

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CONTAINER AND METHOD OF MAKING THE SAME

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Application October 24, 1930, Serial No. 490,891

3 Claims. (Cl. 93—36)

This invention relates to improvements in containers and methods of making the same, especially containers, made of paper, of the type known as cans, having covers which may be applied by hand for the protection of contents. Such cans are convenient and safe for the retailing of various powders, foods and liquids, for example, ice cream or oysters, when sold from bulk. It is particularly desirable that the can itself be capable of serving as an accurate measure of contents; that the closure of the can be both tight and secure; and that the cans be nestable together until used, for conservation of space and freight.

The invention provides a novel combination of structural features whereby an approved superior style of crimped-in bottom closure, and a flanged-disk cylindrical-fitting type of cover may be employed in a tapering can which can be nested. This makes possible, for the first time ever, so far as I am aware, the desired combination of qualities above stated.

Hitherto containers of this general type have been formed with either conical or cylindrical bodies. Conical cans can be nested, but have been subject to the disadvantages, first, that the tighter and more permanent type of sealing of bottom closure, made by annular crimp, could not be used; and, second, that the top cover has had to be of the plane disk type. The latter, since it fits inside the container tops, in a groove at a distance below the actual top, is difficult to insert or remove without slopping of liquid contents; and it precludes the can being used as an accurate measure of the quantity dispensed, by the sales person under practical work-a-day conditions. Cylindrical containers, on the other hand, can have the tight annular crimped-in bottom; and can be covered by the tight-fitting flanged-disk type of cover which is conveniently applied and removed with close fit over the outside of the can body. With such a cover the container can be filled full and the top scraped level, so that every container of like size will obviously have exactly the same measured quantity. This cylindrical style of can however has the disadvantage that it is not adapted for nesting with others, but each can requires its full volume of space for shipping and storage.

An important feature of the present invention is that the conical can body has a cylindrical portion at its top, for receiving tightly an ordinary flanged cover; and has a cylindrical portion at its bottom adapted to be crimped by known methods with the paper flange of a bottom closure. The method of making such a can body is another feature. It is, moreover, an important feature that the improved containers can be produced economically and efficiently, and can be furnished to the retail trade at prices comparing favorably with those of the less strong, less durable and less satisfactory types of conical containers now available.

The invention attains these results by initially forming a plane blank (cut from paper stock, which may be of one, two or more plies) into tubular shape with gradual taper from end to end. In such a tube, of correct dimensions for a particular size of paper can, the desired terminal cylindrical portions may be formed by molding and drawing the paper in its dry state, by pressure of suitable dies. For example, the conical tube may be placed in a female die interiorly shaped with cylindrical walls at top and bottom and with conical wall intervening, so that the conical paper tube rests against the conical wall of the die, leaving spaces between die and tube at said cylindrical places. The male die may be in the form of a soft rubber plunger, conical in shape to fit nicely within the tube. With its bottom abutting against the bottom wall of the female die, inward pressure on the rubber plunger causes lateral spreading of the rubber mass, to fill all available space in the cavity of the female die. Therefore it fills the top and bottom cylindrical portions of the die, with incidental severe pressing of the paper tube at these locations against the wall of the female die. The portions of tube wall which initially stood opposite the top and bottom cylindrical portions of the female die are thus stretched circumferentially to varying extents and are converted from conical to cylindrical shape; and the paper stock retains the new shape after removal from the die.

The bottom portion of the tube, thus made cylindrical, is interiorly adapted to receive within it a disk bottom closure, having a cylindrical flange, and to be crimped with that flange according to known methods to produce an effective liquid-tight seal. The top portion of tube, thus made cylindrical, is exteriorly adapted to receive an ordinary flanged cap-cover, whose cylindrical flange engages tightly about the body cylinder and thus effectively confines contents which may extend to the very top edge of the body walls. The conical body portions permit of the cans being nested to conserve space.

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.

In the accompanying drawing:

Figure 1 is an elevation, in medial section, of a completed closed paper container embodying features of the invention;

Figure 2 illustrates one means of forming the improved style of can body, the conical paper tube being in the female die and the rubber plunger male die being within the tube, in position ready to receive and apply pressure;

Figure 3 is a view similar to Figure 2, pressure having been applied to the plunger with resulting lateral spreading of portions thereof to effect stretching and reshaping of the tube;

Figure 4 is an elevation, in medial section, of a two-compartment nestable container, with removable close fitting cylindrical top and bottom cap-closures;

Figure 5 is an elevation, in medial section, of a can shape which is conical to the very bottom, having a simple closure, and having its cylindrical portion only at the top.

It is a characteristic of the method of manufacture that although the completed can has angles which appear to be re-entrant with respect to the lines of a perfect cone, as seen, for example in Figures 1 and 3, yet the operations upon the initial paper cone, 10^a of Figure 2, are wholly by stretching the paper stock at proper places, and no contracting of the dimensions of the initial paper sheet is a part of the process at any point.

As the rubber interior plug 34 goes under axial compression, it expands equally in all directions radialy, until stopped by the walls of the die 24. Circumferential tension is thus applied simultaneously to all those fibres of the paper which are in any single plane of cross section perpendicular to the axis of the initial cone 10^a and are not immediately supported by the die wall. Since the expanding rubber fills and holds the paper on all sides against slipping, and since it expands uniformly on all sides at once, this tension is applied uniformly all around the circle, and produces a stretching by which each fibre is drawn infinitesimally past its neighbors. This treatment does not in general involve a bending of fibres, as in a folding or spinning process, but rather is a displacing action. The fibres tend to stay permanently in their displaced relative positions. In consequence each finished paper body approximates very closely to the exact shape and size of the die cavity, and to the shape and size of every other can body made in the same die. This is independent of the extent of displacement that may have been undergone. Therefore any slight inequalities of size, that may have resulted from slight variations in the overlapping of ends of the flat paper blanks when made into conical shape, are automatically eliminated because all are afterward stretched to the same size. In consequence it is feasible to make the blanks normally small enough so that even the casually abnormal individuals will slip easily into the die 24.

Referring to the drawing, Figure 1 illustrates a preferred embodiment of my invention, wherein the container body has the main portion of its walls conical as at 10, but has an upper cylindrical portion 12 and a lower cylindrical portion 14. A bottom closure 16 has a flange crimped with the lower cylindrical end of tube in known manner, to provide an effective and durable liquid-tight, annular seal indicated at 18. The top is closed by a flanged cover 20, which may embody a similar crimped seal 22, with the flange 23 engaging around the cylinder 12 with close and secure but readily removable fit. The specific variety of bottom closure, and of flanged top closure or cover, are matters of individual choice; and the novelty of the article resides more particularly in structural features of the container body which permit the use of such closures. Preferably the can construction will start with the stamping of one or more blanks out of suitable paper sheet stock and the winding of it or them into desired initial cone formation 10^a, according to a manner already known. Each blank may be a sector of an annulus, having length to permit a small overlapping of sector ends when thus wound, as seen at 10^b; and the overlapped ends may be glued together so as to preserve the conical tube shape. Where two or more plies of paper are to constitute the can body, blanks of the successive plies may be wound one upon the other, with intervening adhesive. Preferably the places 10^b where successive ply-sections overlap, if there be more than one, will be made to occur at spaced locations so that cumulative extra thickness will not interfere with the tight crimping of the bottom or cover. At each overlap location 10^b the extra thickness, extending along the cone, from end to end, constitutes a tube-strengthening rib. In a two-ply can such ribs may be arranged opposite each other. However, the conical tube may be formed in various other ways.

Figures 2, 3 illustrate a conical paper tube 10^a in the process of being stretched circumferentially, and converted to the shape contemplated by the invention. In Figure 2 the tube is seen standing in its initial completely conical shape within the cavity of a female die 24 whose inner surface has an upper cylindrical portion 26, the lower part of which is larger than the adjacent cone; and a lower cylindrical portion 28 which is less in diameter than the portion 26, and whose upper part conforms to the diameter of the adjacent conical wall 30 which connects the said upper and lower cylindrical portions. This makes a rather abrupt expansion at the shoulder 32 at the junction of 26 with 30. The male die 34, in the form of a plunger, preferably will be of soft rubber adapted to expand laterally when compressed in the axial direction. As seen in Figure 2 this plunger 34 has a shape which fits nicely within the paper tube 10^a, but spaces 36, 38 are left between the tube 10^a and the cylindrical portions 26, 28 of the female die.

Application of pressure to the plunger 34 causes lateral expansion of the plunger, as seen in Figure 3, and the paper tube is thereby stretched to an extent such that it engages against the female die wall at every point along the tube. Thus the tube, under severe pressure, is re-shaped to assume a configuration corresponding with the shape of the female die. Although the extent of stretching may not be great the strain of fibres is accomplished in so thoroughgoing a manner that the fibres, in their infinitesimal relations to each other, retain their conformation to the new shape when the plunger is withdrawn and the tube is removed.

A tube formed in accordance with the invention will have a cylindrical lower end. This may be crimped with the flange of a bottom closure disk, according to known methods, to seal effectively the lower end of the can. The cylindrical ring portion at the upper end enables the can to be capped by the desirable flanged cover type of closure, wherein the cylindrical flange engages tightly around the cylindrical top and effectively confines the contents of the container. Such con-

tents may fill the container to the very top edge without there being danger of spilling either in the act of covering the can or in the act of removing the cover.

In the case of ice cream, for example, the container may be packed by a sales person so that it stands more than full, and then the surplus may be removed by drawing a knife or the like across the top of the can, leaving the container filled just flush with the top. As the cans can be made of precise size, each container may constitute an accurate measure. This is a point of value for the assurance both of the seller and of the buyer of contents. And it is of economic value to the storekeeper that no other act or time of the sales person is requisite for the measuring, beyond the mere act of filling of the delivery can.

The relative smallness of the lower cylinder and largeness of the upper cylinders facilitate nesting.

Figure 4 illustrates a two compartment container 40 wherein a dividing partition 42, which may be perforated as at 44, if desired, is held by being wedged in the cone, where it may be permanently secured by glue or other adhesive. The container body is the same as that of Figure 1 only the lower end is left cylindrical and uncrimped. Cylindrical caps 46, 46' may close it, like the cap 20, 22 of Figure 1. The compartments, holding diverse contents, may each be thus removably capped. For shipment and storage until used the lower cap can be nested within the upper.

The can body 48 of Figure 5 dispenses with the cylindrical bottom portion and has a conical bottom closure 50 glued into the conical end of the tube. This style may be used where a glue joint is sufficient, and it has the advantage of being more deeply nestable, and at the same time can receive a flanged cover cap as in the other forms.

Cans embodying the invention may be made economically by simple manufacturing operations. They eliminate the objections which heretofore have attended use of the strong and durable cylindrical type of paper can, and have the convenient and economical space and freight saving features of the conical cans.

I claim as my invention:

1. The method of forming a cap-receiving top end on a tapering tubular body made of paper or the like, comprising the circumferential stretching of the paper walls at a zone between the extreme larger end of the tube and a location near said end, so that the tube walls at said zone are expanded to a diameter at least equal to the diameter of said extreme end, which latter remains substantially unexpanded.

2. A container body comprising sheet paper wrapped into tapering tubular form, and at its larger extremity remaining substantially unexpanded, but at an annular area adjacent to the larger end of the tube being expanded from its said tapering form to a form having a diameter at least as large as the diameter of the extremity of said larger end.

3. The method of forming a cylindrical portion in a tapering shell of paper or the like, comprising the applying of pressure upon the paper obliquely outward at the zone where the forming is to be done, and thereby stretching the paper circumferentially, said pressure and stretching being applied simultaneously throughout said zone, and uniformly in all directions from the axis and approximately perpendicular to the surface of the shell throughout said zone; and at the same time providing an unyielding resisting force throughout the zone, said resistance being applied at the desired final location of the exterior face of the paper, in said zone.

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