July 14, 1936. J. R. MORRIS 2,047,284

BOTTLE CLOSURE

Filed April 18, 1935

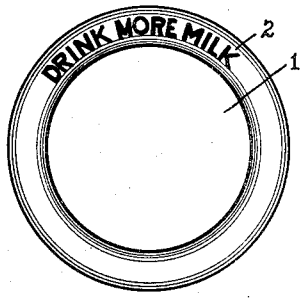


Fig. I

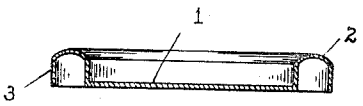


Fig. II



Fig. III

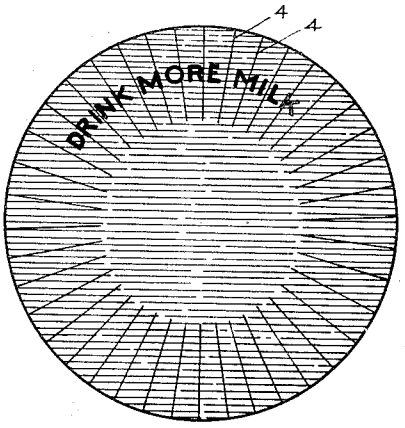


Fig. IV

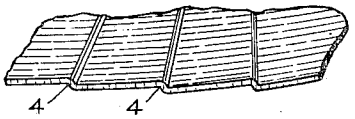


Fig. V

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BOTTLE CLOSURE

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9 Claims. (Cl. 93—1)

This invention relates to the shaping of articles from compressible sheet material with surface legends or ornamentation upon them, and to the product thereof. It finds practical application in the forming of closures for milk bottles.

In the accompanying drawing Fig. I is a view in plan, and Fig. II a view in central and vertical section, of a bottle closure in the production of which the invention may be enjoyed. Fig. III is a view in plan of the blank from which the cap is formed. The blank is here shown to bear a legend that has been applied to it according to the procedure of the invention. Fig. IV is a similar view of the blank after certain further steps in the procedure have been performed upon it. Fig. V is a fragmentary view, to larger scale, showing the edge of the blank of Fig. IV.

In Figs. I and II a milk bottle closure of the sanitary hood seal type is indicated. In shape it consists of a central circular flat portion 1, of proper size to rest upon a horizontal ledge or cap seat formed in the throat of the bottle, and a peripheral arched rim 2, adapted when the closure is in place to overlie the lip of the bottle. The rim includes a skirt 3, adapted when the closure is in place to surround and shield in a sanitary manner the lower, outer surface of the bottle's lip. The closure, while possessing in some degree softness and flexibility, is yet of such rigidity and resilience as to engage the bottle lip over opposed inner and outer surfaces, and so to afford secure and tight closure, and yet to be readily removable.

Such a bottle closure is formed from a flat disc of paper (Fig. III) that is impregnated with wax, impressed at the margin with radially extending corrugations, and then shaped between dies. In the shaping operation the central portion is not appreciably changed; by consolidation under vertical pressure it is reduced somewhat in thickness. The marginal portion, however, is, manifestly, greatly changed; linear dimensions in circumferential direction are reduced, the mass per unit of area is on the average increased.

The crest of the rim affords an area that, if otherwise practicable, might advantageously carry advertising legends; but, since the surface in this part is rounded, and since the material is wax-filled paper, the difficulties in the way of so doing have not heretofore been overcome. Indeed, the desire to apply advertising legends has rendered more desirable the common practice of including within the depressed central portion of the upper side of the closure a legend-bearing disc, frictionally engaged at its edge by the inner vertical wall of the rim of the closure. This added disc, being flat, may be printed upon while in unwaxed condition and, if desired, it may after printing be waxed; but it is the shaping of the rim of the closure body itself, and the incidental distortion of such legends as might initially be printed on the marginal portion thereof, that has forbidden the application of good-appearing legends to the rim, either on its crest or skirt.

I have discovered that, by placing limitation upon the interval between the initial corrugations with which the marginal portion of the waxed blank is impressed, by bringing the interval at which the corrugations are spaced into definite ratio to the thickness of the blank, by giving to such initial corrugations particular and peculiar features of shape, and by final shaping of the blank between dies that are smooth, I get sufficient lateral displacement of the material—such flow—between the dies, so evenly distributed, as not only to eliminate the initial corrugations, but also to afford unimpaired legibility of a previously printed legend. The letters are merely compressed upon circumferential lines, the sharpness of line is not impaired, and the intensity of the printing is increased.

The corrugating of the margin of the waxed blank, in preparation for the rim-shaping operation, is effected between rolls. The undulations are advantageously of the saw-tooth form shown in Fig. V; that is to say, one slope of the wave is much steeper than the other. In consequence, in the ensuing pressing operation, the displacement—the flow—of the material will be, with substantial completeness, in one direction, circumferentially of the blank. This I have found advantageous in the attaining of my ends.

I have found that, if the interval between succeeding corrugations be not more than fifteen times the thickness of the material, good results may be gained; I prefer, however, an interval not over half as great as that just indicated. The linear diminution in circumferential extent of the portion of the blank that forms the crest of the rim of an ordinary bottle closure of the character described is about 15%. This 15% compression will, under the conditions indicated, afford an article on which an initially applied legend emerges clear and sharp.

By way of example and illustration I give the following figures. The paper used for forming these bottle closures may be of the order of 0.027 of an inch thick. Material for this purpose is

already standardized both in weight and in quality. The initial disc may be three inches in diameter. Upon this disc I first (and before waxing) print the desired legend, as illustrated in Fig. III. A central area one and one half inches in diameter continues unchanged in shape in the finished closure. It is the marginal three quarters of an inch that are shaped to form the rim. Circumferentially and in the middle of this marginal area the desired legend is printed. It is spaced a quarter of an inch from the edge of the blank, and lies therefore at the perimeter of a circle two and one half inches in diameter.

When the legend has been printed, the blank is waxed and impressed in its marginal portion with the radial undulations 4. The undulated blank has an overall thickness of about twice that of the paper itself. As has been said, one slope of the undulation is gentle, the other abrupt, giving to the edge of the blank the saw-tooth form shown in Fig. V. As to the spacing of the undulations, I have found twenty, equally spaced about the circumference, to be adequate. The interval from crest to crest is then about 0.4 of an inch. I prefer, however, forty undulations to the circumference (interval, 0.2 of an inch). If the number be twenty, the space from crest to crest will be of the order of fifteen times the thickness of the blank.

The printed, waxed, and corrugated blank is then pressed between dies that are plain and uncorrugated. Only a single pressing is required.

The resultant closure is smooth-surfaced throughout. Its rim lacks corrugations. And the distribution of material between the dies is such that the legend, reduced from a circular diameter of two and one-half to one of about two inches, its letters correspondingly compressed and reduced in width and the spaces between letters reduced in width, is not distorted nor in any degree disfigured; the symmetry of the letters is unimpaired; the lines are sharp; and the intensity of the print is increased. In the pressing operation the displacement of the material is, because of the refinement in shape given to the initial corrugations, chiefly and in effect completely, in one direction, circumferentially of the blank; and it is to this unidirectional displacement that I impute greater excellence in the sharpness and symmetry of the characters of the legend borne by the finished article.

The design or legend, applied in the manner described, is, manifestly, protected beneath a surface film of wax, with which the paper has been impregnated and coated. Printed upon the paper before waxing, this design or legend will not become rubbed nor blurred, nor will it wash off; it is durable, always sharp and legible, and ineradicable. The invention is not limited to the production of bottle closures; it is applicable to compressed paper articles generally—to cups, for example, and small box-covers. In essence, the invention has to do with sheet material, and requires only that the material be compressible. To the invention in such broader aspect, the waxing of the material is circumstantial. In the case of a cover for a cosmetic box, for example, paper may be used and the waxing step omitted. Examples of other materials that may be used without impregnation are celluloid, cellophane, etc. Other impregnating material than wax may be employed; resin, for example. With such variety in material the invention may be enjoyed.

The legend may in like manner and with like effect be placed upon the outer face 3 of the depending skirt of the arched rim portion of the closure.

As shown in the drawing, the legend appears as dark characters (ordinarily printed) upon a suitably colored, and ordinary white, ground; the printing, obviously, may be in negative; the ground areas may be the printed areas, and the characters themselves may be left blank.

I have used the term legend, in lack of an adequate term, to designate generally words, letters, trade-marks, ornamental designs, and visible marks of whatever sort. And in the ensuing claims, whether I use the term legend or the word design, I mean to bring within their scope all such visible marks.

I claim as my invention:

1. The method herein described of producing a shaped article from a blank of compressible sheet material bearing a surface design, which consists in laying the design upon the flat blank, corrugating the blank with corrugations that in the design-bearing portion of the blank are spaced at intervals not exceeding 15 times the thickness of the blank, and shaping the blank with diminution in the linear dimensions of the design-bearing portion thereof.

2. The method herein described of producing a shaped article from a blank of compressible sheet material bearing a surface design, which consists in laying the design upon the flat blank, corrugating the blank, and shaping the blank under compression, with diminution in the linear dimensions of the design-bearing portion thereof and with unidirectional displacement of the material.

3. The method herein described of producing a shaped article of waxed paper board bearing a surface design from a flat blank which consists in laying the design upon the flat and unwaxed blank, waxing the blank, corrugating the waxed blank with corrugations that in the design-bearing portion of the blank are spaced at intervals not exceeding 15 times the thickness of the blank, and shaping the blank with diminution in the linear dimensions of the design-bearing portion thereof.

4. The method herein described of producing a shaped article of waxed paper board bearing a surface design from a flat blank which consists in laying the design upon the flat and unwaxed blank, waxing the blank, corrugating the waxed blank with corrugations that in the design-bearing portion of the blank are spaced at intervals not exceeding 15 times the thickness of the blank, and shaping the blank with a diminution of the order of 15% in the linear dimensions of the design-bearing portion thereof.

5. The method herein described of forming a bottle closure of hood seal type from a disc of paper of a thickness of the order of 0.027 of an inch, with a legend borne peripherally upon the rim, which consists in printing the legend upon the margin of the initial disc of unwaxed paper, waxing the printed disc, corrugating the marginal legend-bearing portion of the disc with radially extending corrugations spaced at intervals of the order of 0.4 of an inch as a maximum, shaping the corrugated blank between dies and in so doing compressing the legend-bearing portion of the blank with reduction of the order of 15% in linear dimensions.

6. The method herein described of producing a shaped article of paper bearing a surface design from a flat blank which consists in laying the design upon the flat paper, corrugating the paper blank, and reducing under compression the linear

dimensions of the blank and simultaneously eliminating the corrugations with unidirectional displacement of the paper fibers.

7. The method herein described of producing a shaped article of compressible sheet material bearing a surface design from a flat blank which consists in laying the design upon the flat blank, corrugating the blank and reducing under compression the linear dimensions of the blank and simultaneously eliminating the corrugations with unidirectional displacement of the material.

8. The method herein described of producing a shaped article of waxed paper board bearing a surface design from a flat blank which consists in laying the design upon the flat and unwaxed blank, waxing the blank, corrugating the waxed blank, and reducing under compression the linear dimensions of the blank and simultaneously eliminating the corrugations with unidirectional displacement of the material.

9. The method herein described of forming a bottle closure of hood seal type having a central circular flat field and a peripheral arched rim from a thin flat disc with a legend peripherally borne upon the arch of the rim, which consists in printing the legend upon the margin of the initial disc, corrugating the marginal legend-bearing portion of the disc with radially extending corrugations of saw-tooth form, and compressing the marginal portion of the disc to arched form with unidirectional circumferential displacement of the substance of the disc.

JAMES REED MORRIS.