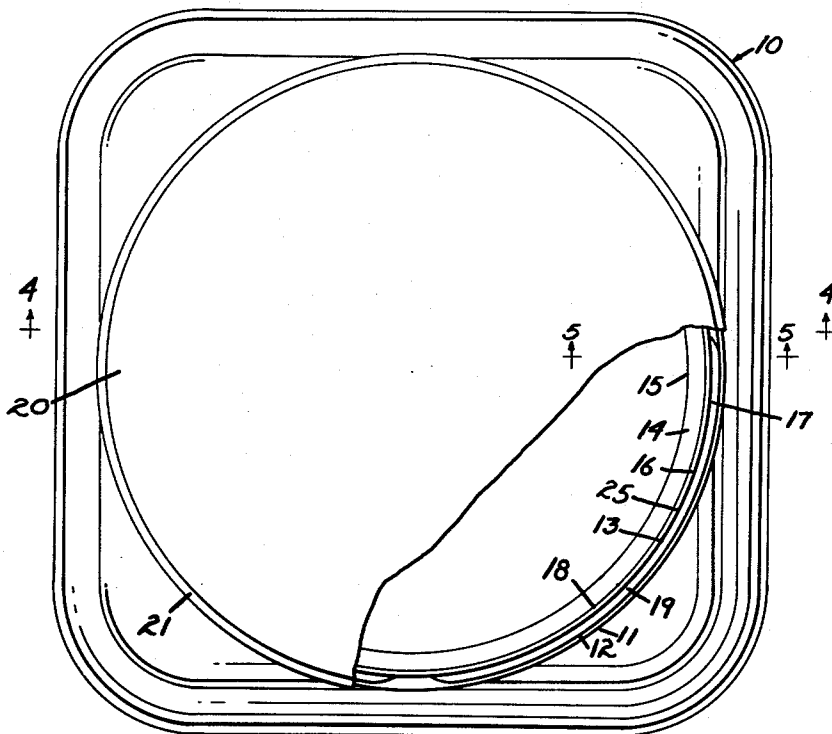
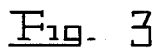


Filed Jan. 24, 1964

2 Sheets-Sheet 1

3,229,841



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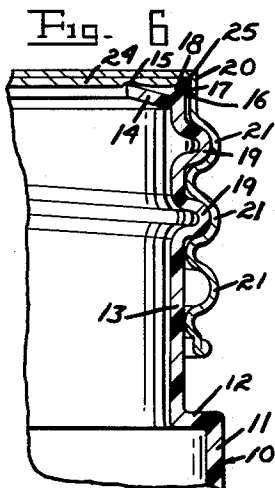
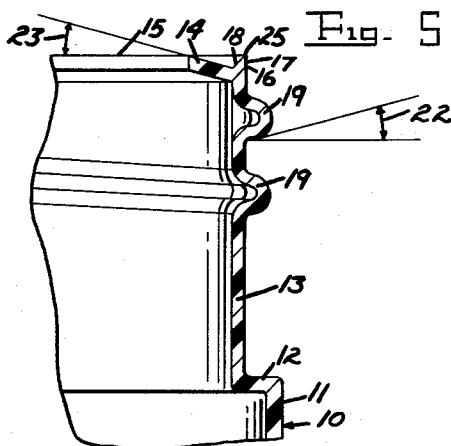
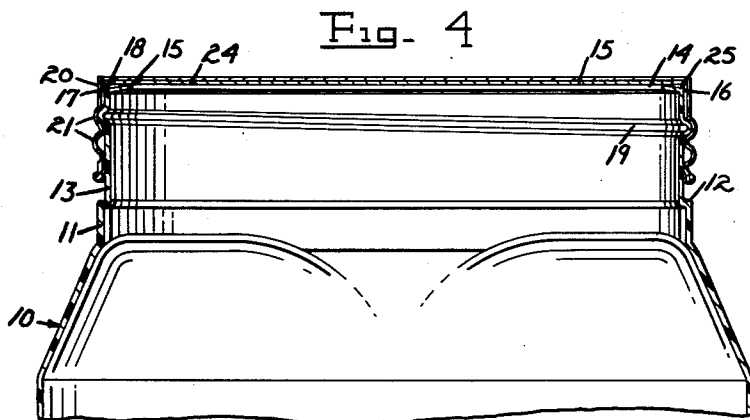
Jan. 18, 1966

R. L. BAILEY
CAP SUPPORTING INLET STRUCTURE FOR
PLASTIC BOTTLES AND JARS

3,229,841

Filed Jan. 24, 1964

2 Sheets-Sheet 2



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3,229,841

CAP SUPPORTING INLET STRUCTURE FOR
PLASTIC BOTTLES AND JARS

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Filed Jan. 24, 1964, Ser. No. 340,071

7 Claims. (Cl. 215—31)

This invention is concerned with a novel inlet for a plastic bottle or jar, designed primarily for lightweight bottles or jars made of yieldable plastic materials, such as the various available types of polyethylene resins.

It is becoming increasingly common to package and market materials, such as foods or liquids in plastic bottles or jars designed for a single trip so that the container can be thrown away after use. In order to produce such a container economically, the wall thicknesses of the container must be held to a minimum, sufficient to maintain the general shape of the container when full, and also sufficient to provide the necessary cap support at the inlet of the bottle or jar. The problem of sufficient stiffness at the inlet becomes acute in the case of large gallon sized jars, having a wide inlet of approximately five inches. The present invention is concerned with the strengthening of the inlet structure by structural modification of the inlet, and also with the enhancement of the sealing properties of the inlet structure against the cap liner.

It is a first object of this invention to provide an improved inlet structure that insures the required stiffness about the inlet opening, and which provides a reinforced opening area to accommodate the pressure exerted thereon by the screw threads of a cap.

Another object of this invention is to provide a unique sealing feature to insure positive sealing of the inlet opening against a cap liner threaded thereon.

Another object of this invention is to provide a sealing structure that engages the cap liner along two circular lines concentric with one another, so that each reinforces the other by gripping the cap liner along two spaced concentric circular paths.

These and further objects will be evident from a study of the following detailed disclosure, taken in conjunction with the accompanying drawings, the drawings illustrating a preferred form of the invention. It is to be understood that the particular form illustrated in the drawings is only one example of the application of this invention to a particular jar and is not intended to restrict the scope of applicant's invention, which is set out in the claims that follow.

In the drawings:

FIGURE 1 is a side view of a bottle constructed according to this invention provided with a cap threadably secured at its inlet;

FIGURE 2 is an enlarged fragmentary side view of the top portion of the bottle shown in FIGURE 1 with a portion of the cap broken away to show the inlet structure;

FIGURE 3 is an enlarged top view of the bottle seen in FIGURE 1 with a portion of the cap broken away to show the bottle structure;

FIGURE 4 is a cross sectional fragmentary view taken along line 4—4 in FIGURE 3 showing the upper portion of the bottle and cap;

FIGURE 5 is an enlarged fragmentary section taken along line 5—5 in FIGURE 3, illustrating the inlet structure without a cap mounted thereon; and

FIGURE 6 is a view similar to FIGURE 5 showing the cap in its threaded position.

The structure of the bottle shown in the drawings is designed to best incorporate the features of this invention, particularly as it would be applied to a large gallon sized plastic jar having an inlet opening diameter of ap-

proximately five inches. The jar is designed to be a disposable container for one trip usage having sufficient wall strength so as to be self-supporting when filled with material, and would normally be blow molded of suitable polyethylene resin using conventional blow molding techniques. However, the invention is not limited to blow molding operations, nor to particular resins, but is adaptable to any method or yieldable plastic resin that might be desired in the production of a particular bottle or jar.

The invention itself is concerned with the mechanical structure of the inlet produced on the jar, irrespective of the manner in which the jar is produced or the material from which it is made. A typical jar 10 is shown in FIGURE 1, having a general square cross sectional configuration. At the opening of the jar 10 is mounted a cap 20, having threads 21 that engage threads 19 on the jar 10.

The details of the inlet structure can best be seen in FIGURES 2 through 6. Referring to these figures, the top of jar 10 is provided with a cylindrical upright neck 11 that is centered about the vertical axis of the jar 10. The neck 11 is capped by an inwardly directed shoulder 12 that leads to the bottom end of an upright cylindrical wall 13.

The upright wall 13 is coaxial relative to the neck 11 and has formed thereon the necessary external threads 19, which are preferably located as near to the top edge of the wall 13 as practicable. The threads 19 project outwardly from the wall 13, and normally will provide dimpled recesses along the inner surface of the wall 13. The thread structure itself provides additional rigidity to the wall 13 by its provision of circumferential ridges, and for this reason, should be located adjacent the top edge of wall 13 so as to insure the necessary rigidity of the thin wall 13 along the open end of the inlet opening.

At the top edge of the wall 13 is formed an integral lip 14 that is projected inwardly and upwardly from the wall 13 toward the center axis of the jar 10. The lip 14 is conical and terminates in an upper corner edge 15 that is circular in configuration and coaxial with the wall 13. It is important to note that the corner edge 15 is a sharp corner formed by perpendicular surfaces along a particular section. The edge 15 is designed to produce a biting edge that can grip the liner of cap 20 as will be described below.

There is preferably provided a projection 16 protruding upwardly from the top end of wall 13 and formed by a first surface 17 that is common to the outer surface of wall 13 and a second downwardly directed angular surface 18 that leads to the upper surface of the lip 14. Again, the projection 16 is terminated in an upwardly directed corner edge 25 that is preferably concentric with and coplanar with the edge 15 of lip 14. Thus the inlet of bottle 10 is provided with two concentric corner edges 15 and 25 that will simultaneously grip the liner 24 of the cap 20 in the manner best illustrated in FIGURE 6.

The design of the lip 14 is preferably such that it subtends an angle 23 relative to a plane perpendicular to the axis of bottle 10 substantially equal to the angle 22 that is the general angle of the thread sides produced by threads 19 relative to the horizontal. These angles are illustrated in FIGURE 5 as being about 15 degrees. FIGURE 5 further shows the substantial alignment of the lip 14 and the outwardly protruding threads 19. This alignment insures that the maximum transverse thickness of available plastic material will be provided about the inlet so as to resist inward pressure created by the tightening of cap 20 on bottle 10. The substantial alignment of the two angles 22 and 23 assists in producing this direct opposition by opposing the biting force of the edge 15 against the forces that will be directed radially inward and upward by the cooperating threads 19 and 21.

The structure just described provides an inside biting

edge 15 at the top of lip 14 that will yieldably force itself into the cap line 24 and oppose inward collapse of the inlet opening of bottle 10 that might be caused by the radial component of the force exerted by the cap 20 wedging itself against the bottle 10 due to the force of threads 19 and 21. The edge 15 also provides a first sealing line of circular configuration that will be reinforced by any internal pressure within the bottle 10 due to the tightening of the cap 20. Any such internal forces will be applied against the lower surface of the lip 14 and further force the edge 15 more tightly against the liner 24.

The structure provides an outer biting edge 25 at the top end of the projection 16 that is the major seal of the cap structure. The maximum force of the cap 20 in an axial direction will be exerted on the edge 25 so that it will press most severely into the cap liner 24. This biting action of the concentric edge 25 also aids to oppose radial collapse of the wall 13 by resisting any movement of the upper end of the wall 13 in a radial direction.

The two edges 15 and 25 therefore supplement one another and reinforce each other in opposing both radial and axial forces that might tend to break the necessary seal and cause collapse of the relatively thin flexible wall 13. The edge 25 furthermore serves as a definite stop against the cap 20 so that the inward and upward force of the cap threads 21 against the bottle threads 19 provides a force couplet that tends to press the edges 15 upward against the cap 20. The inlet therefore has two seals rather than a single seal against the cap 20 and two upwardly directed edges to oppose collapse of the thread structure.

The inlet structure just described is applicable to jars or bottles designed to be filled with either hot or cold materials. The necessary tolerances between the wall 13 and the cap 20 will obviously be chosen so as to provide the proper fit after allowing for thermal expansion or contraction of the plastic material of the bottle 10. Such tolerances are known in the industry, and would be applied in this instance in the conventional manner.

In any respect, the reinforced inlet structure with this improved seal allows one to utilize thinner walls in the jar structure and thereby reduce the cost of the jar while improving its sealing qualities against the cap 20. The size of the inlet can be made larger or smaller as might be required in a particular application, the shape of the inlet being available for any particular size required. Other means of fastening the cap 20 to the bottle 10 might be utilized, in place of the threads shown in the drawings, however some outwardly protruding ridge about the upper end of wall 13 is advisable so as to insure the necessary rigidity of wall 13 so as to maintain its cylindrical configuration. In actual practice, the jar illustrated in the drawings has maintained an extremely effective seal, and has produced the necessary strong wall structure for receiving the cap 20.

Since many design changes might be made in the incorporation of this invention to a particular jar or bottle, the details of the example illustrated are not to restrict the scope of the invention which is set out in the following claims.

Having thus described my invention, I claim:

1. A cap supporting inlet structure for plastic bottles, comprising: an upright cylindrical wall of yieldable plastic material having outwardly protruding means formed thereon about its outside surface adjacent to the upper edge thereof; and a peripheral lip formed integrally with said wall along the top edge thereof, said lip being directed inwardly and upwardly relative to said wall and terminating in an upper corner edge of circular configuration, said upper corner edge of said lip being coaxial with said wall;

an annular projection formed integrally with said wall and directed upwardly from the upper edge of said wall, said projection terminating in an upper corner

edge of circular configuration, said upper corner edge of said projection being coaxial with said wall.

2. A cap supporting inlet structure for plastic bottles, comprising:

an upright cylindrical wall of yieldable plastic material having protruding threads formed thereon adjacent the upper edge thereof; and an upwardly and inwardly directed lip formed integrally with said wall along the upper edge thereof, said lip terminating in an upper corner edge of circular configuration coaxial with said wall.

3. A structure as defined in claim 2, further comprising:

an annular projection formed integrally with said wall and directed upwardly from the upper edge of said wall, said projection terminating in an upper corner edge of circular configuration, said upper corner edge of said projection being coaxial with said wall.

4. A structure as defined in claim 2, further comprising:

an annular projection formed integrally with said wall and lip and directed upwardly from the upper edge of said wall as a continuation thereof, said projection terminating in an upper corner edge of circular configuration, said upper corner edge of said projection being coaxial with said wall and also being coplanar with said upper corner edge of said lip.

5. A cap supporting inlet structure for plastic bottles, comprising:

an upright cylindrical wall of yieldable plastic material having outwardly protruding threads formed thereon adjacent the upper edge thereof, the sides of the threads being angularly disposed relative to planes perpendicular to the axis of said wall;

a peripheral lip formed integrally with said wall along the top edge thereof, said lip being directed inwardly and upwardly relative to said wall at an angle relative to a plane perpendicular to the wall axis substantially equal to the angular disposition of said threads and terminating in an upper corner edge of circular configuration, said upper corner edge of said lip being coaxial with said wall;

and an annular projection formed integrally with said wall and lip, said annular projection being directed upwardly from the top edge of said wall as a continuation thereof, said projection terminating in an upper corner edge of circular configuration located along the outer cylindrical surfaces of said wall, said upper corner edge of said projection being coaxial with said wall and coplanar with the upper corner edge of said lip.

6. A structure as defined in claim 5, further comprising:

an annular shoulder formed at the base of said wall and projecting radially outward therefrom; and a cylindrical neck extending downwardly from said shoulder at the outside edge thereof, said neck being coaxial with said wall.

7. A structure as defined in claim 5, wherein said projection comprises:

a first surface common to the outside surface of said wall, extending to the upper corner edge of said projection;

and a second surface extending angularly inward from said upper corner edge of said projection to the upper surface of said lip.

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JOSEPH R. LECLAIR, *Primary Examiner*.

FRANKLIN T. GARRETT, *Examiner*.