

[54] **PLASTIC CONTAINER WITH PLUG-TYPE PLASTIC COVER**

[76] Inventor: **Raymond A. Heisler**, 657 Dakota Trl., Franklin Lakes Township, N.J. 07417.

[22] Filed: **July 26, 1972**

[21] Appl. No.: 275,443

[52] **U.S. Cl.**..... **220/60 R**, 220/54, 220/97 R

[51] Int. Cl...... B65d 43/10

[58] **Field of Search**..... 220/42.59, 60.54, 97 R,
220/97 C; 215/40, 41; 150/0.5

[56] **References Cited**

UNITED STATES PATENTS

2,941,660	6/1960	Tupper.....	220/42 E
3,205,677	9/1965	Stoner.....	220/97 C
3,596,694	8/1971	Jaeniche.....	220/60 R
3,609,263	9/1971	Clementi.....	220/60 R
3,642,167	2/1972	Kinney.....	220/60 R
3,730,382	5/1973	Heisler.....	220/60

Primary Examiner—William I. Price

Assistant Examiner—Joseph Man-Fu Moy

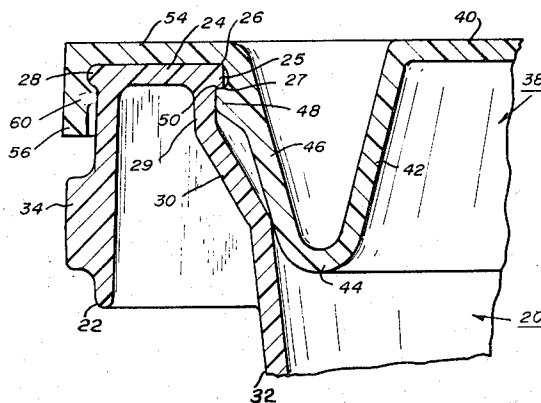
Attorney, Agent, or Firm—Ralph R. Roberts

[57]

ABSTRACT

This invention pertains to plastic pails closed by plug-type plastic covers such as that shown in my U.S. Pat. application Ser. No. 122,303 filed Mar. 9, 1971. The pail and cover disclosed in the present application provide four modifications in which the tension developed in the annular top ring portion of the attached cover is used to retain mating inner and outer tongue and groove portions in a tightly sealed condition. In one embodiment the cover is molded so that in a relaxed condition it has a convex configuration while the container top rim lies in a common plane. In a second embodiment the cover is molded so that in its relaxed condition the top outer ring portion lies in a common plane while the mating rim portion of the container is molded in a convex condition. In a third embodiment the cover and container are molded each with outwardly extending tear-away rim portions which, after the cover is mounted, are sealed to each other to provide a hermetic seal of the container and contents. In yet another embodiment an inner sealing bead is made bifurcated so as to form two sealing ring portions when the cover is mounted on the container.

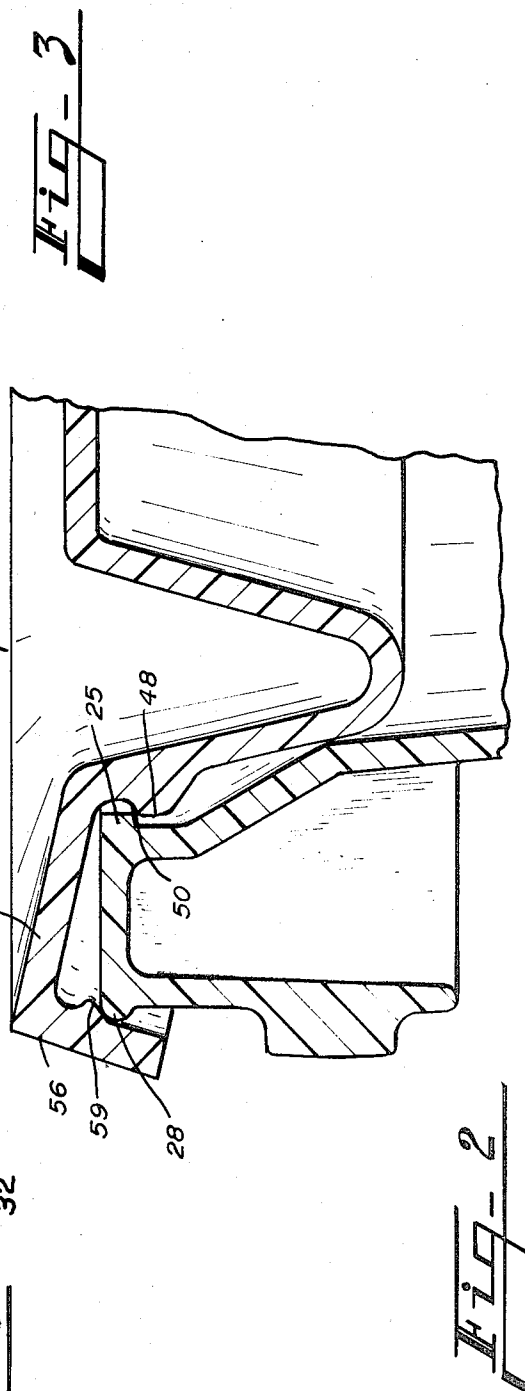
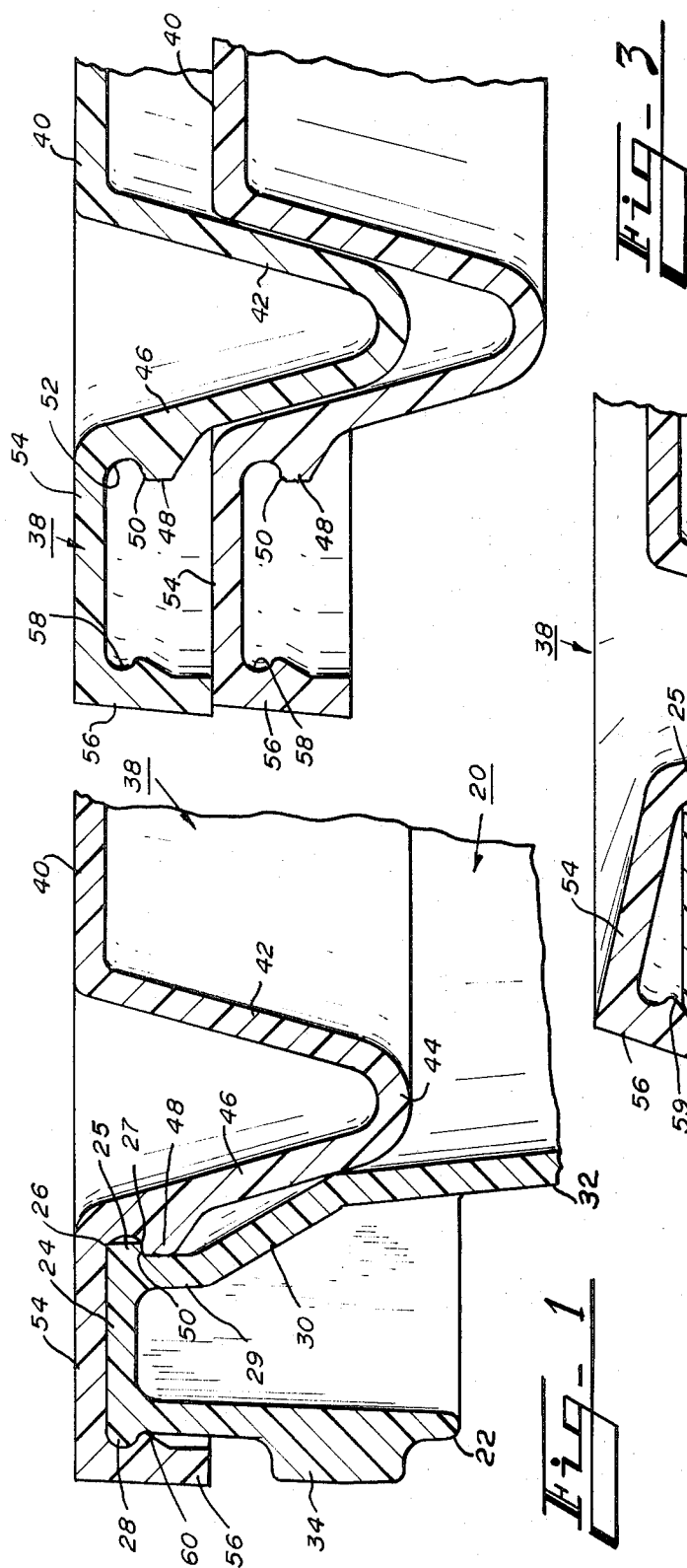
12 Claims, 18 Drawing Figures



PATENTED JUN 18 1974

3,817,420

SHEET 1 OF 5



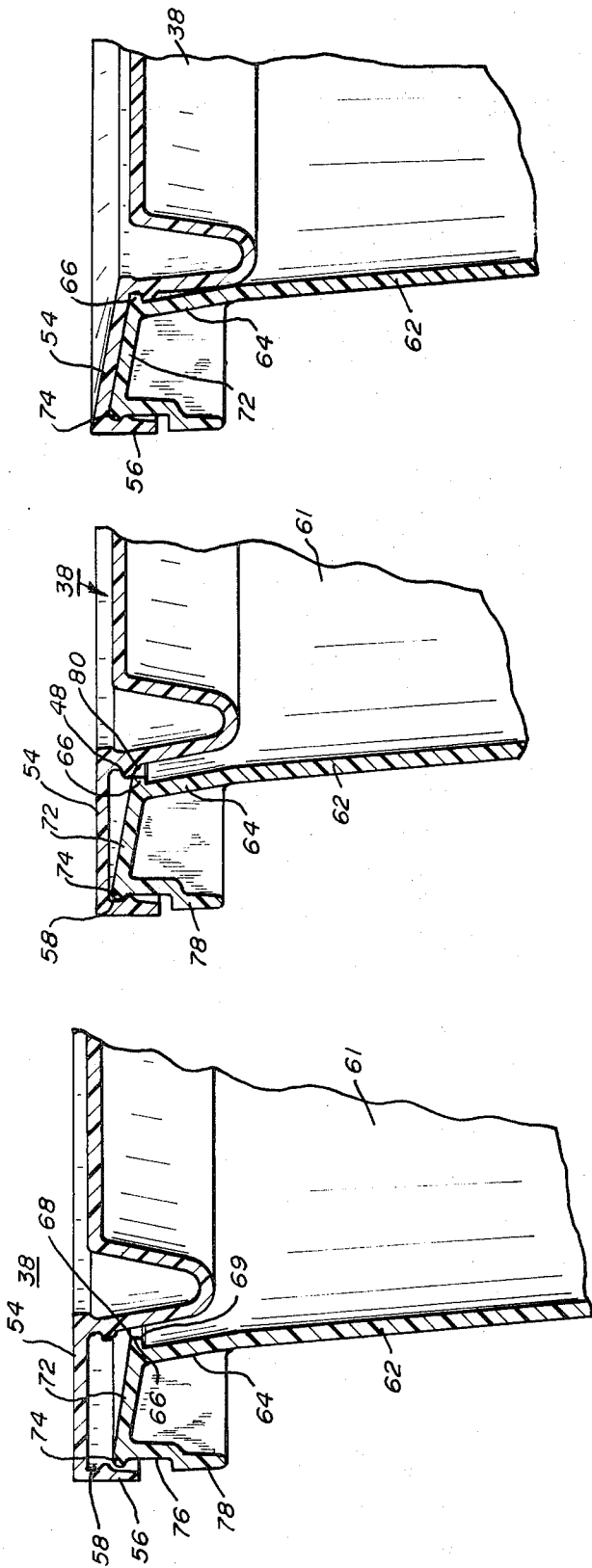


Fig. 4

Fig. 5

Fig. 6

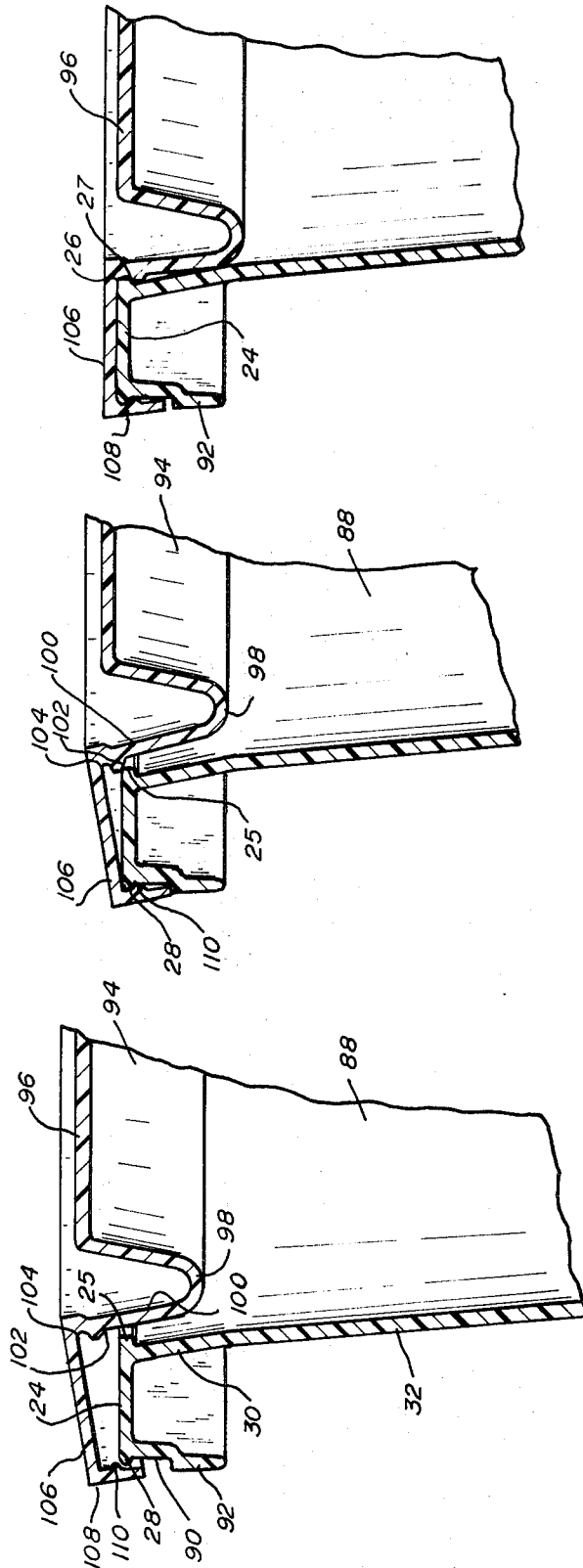
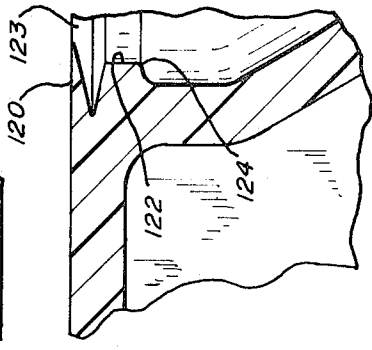
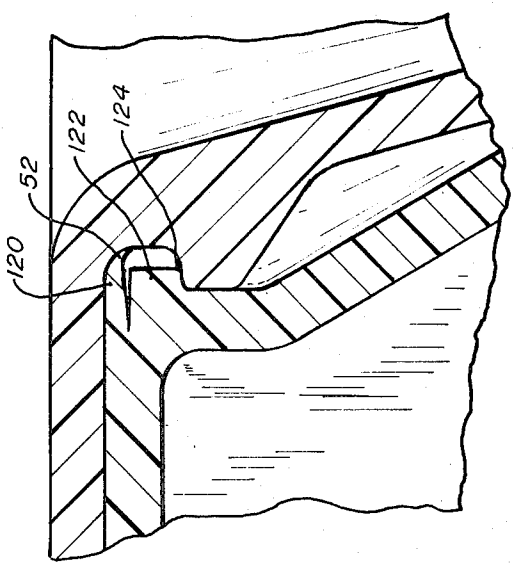
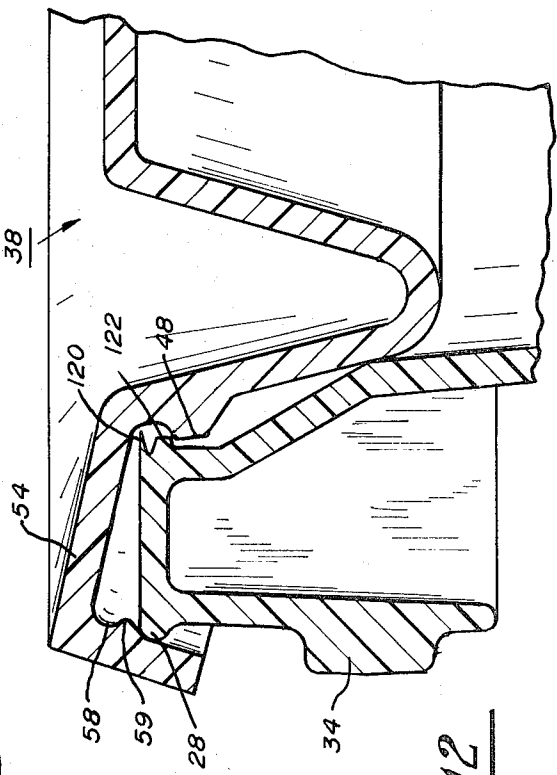
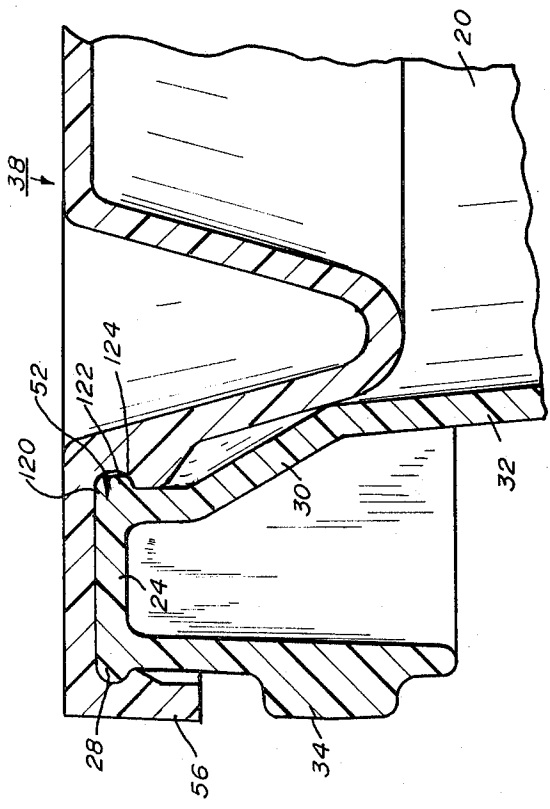
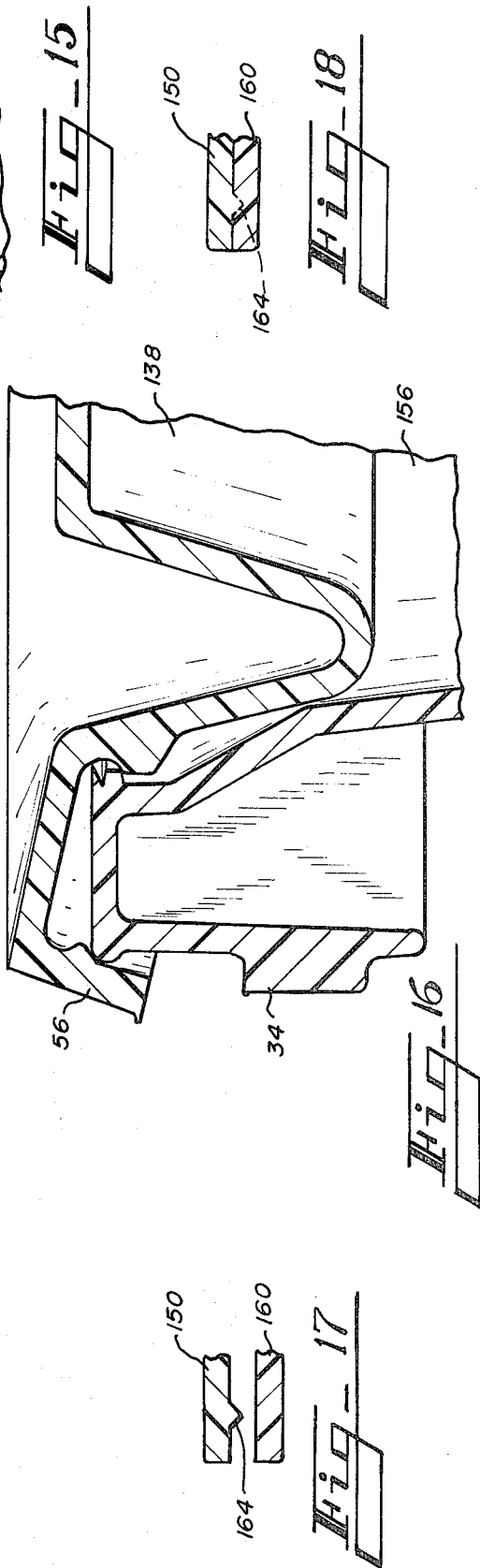
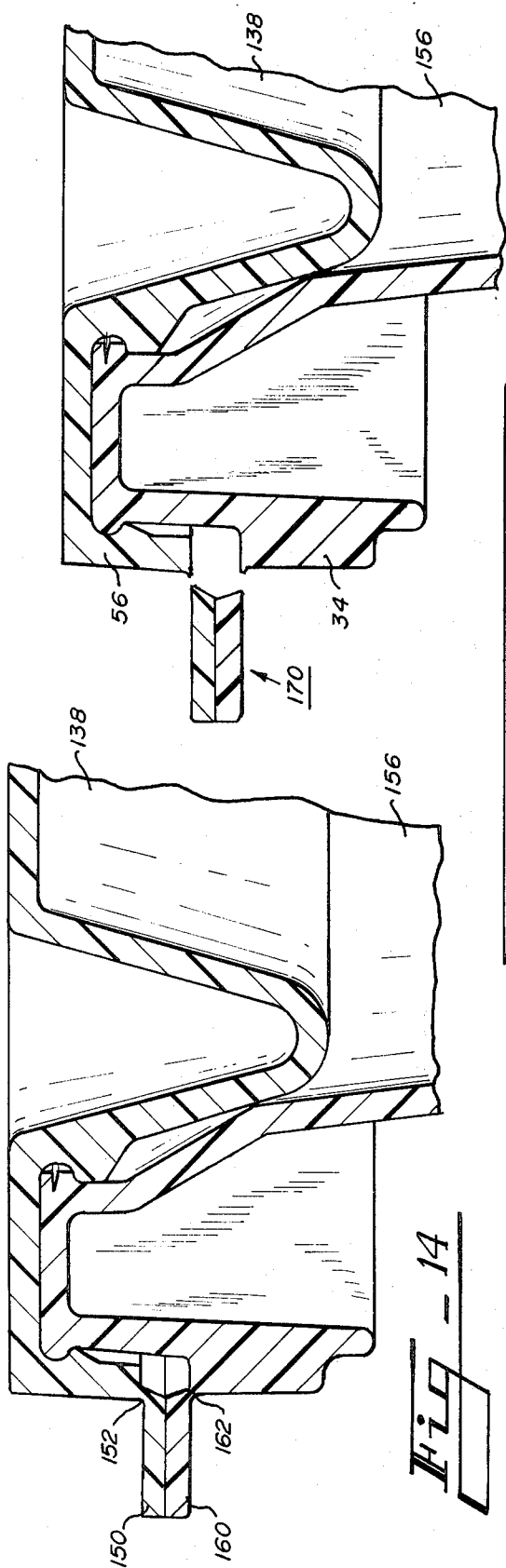


Fig. 7

Fig. 8

Fig. 9





PLASTIC CONTAINER WITH PLUG-TYPE PLASTIC COVER

CROSS REFERENCE TO RELATED APPLICATION

Reference is hereby made to my copending U.S. Pat. application Ser. No. 122,303 filed Mar. 9, 1971 and entitled, "Plastic Pail with Integral Handle and Plug-Type Plastic Cover."

BACKGROUND OF THE INVENTION

1. Field of the Invention

With reference to the classification of art as established in the U.S. Patent Office this invention pertains to the general class entitled, "Bottles and Jars" and the subclass of "Closures — elastic." Also pertinent is the general class entitled, "Metallic Receptacles" and the subclasses of "closures — slip type" and "closures — integral with closure or receptacle-snapping." Also pertinent is the general class entitled, "Cloth, Leather and Rubber Receptacles" and the subclass of "miscellaneous."

2. Description of the Prior Art

Plastic containers including tapered pails for paint, food-stuffs and the like are well known but insofar as is known, it is novel to provide a container and cover wherein the container has a top rim portion which has both an inner circular bead and an outer bead or lip which are precisely sized to snugly retain a grooved plug-type cover. The cover is also precisely sized and when mounted, the cover is stretched to cause a tension to be developed in the cover rim between inner and outer retaining lip portions. Plastic containers using a flexible cover are well known and among those to be particularly noted with reference to this invention is U.S. Pat. No. 2,859,786 to TUPPER as issued on Nov. 11, 1958; U.S. Pat. No. 2,833,324 to BURROUGHS as issued on May 6, 1958; U.S. Pat. No. 3,335,774 to REED as issued on Aug. 15, 1967 and U.S. Pat. No. 3,618,802 to YATES, Jr. as issued on Nov. 9, 1971.

Plastic containers, particularly those used to package and store prepared foods such as margarine, have flexible covers but usually use an adhesive seal to maintain a hermetic or vacuum seal. Many attempts have been made to provide a plastic container for use in the packaging of paint, particularly in a one-gallon container. In such a container, because of the weight of the contents, it is essential that the pail and cover have sealing and retaining abilities at least equal to, if not superior to, a metal container with a double tight cover. Blow-molded plastic containers are, of course, well known but in general when they are to be sealed they are closed by a screw-type cover. In the present invention in addition to the ease of closing and sealing the open end of the container by a cover also requires that the cover provide a positive seal and retention during its shipment and storage. This cover is also easily removable by the customer and may also be easily replaced for resealing the container.

This present invention pertains to a plastic container which has an upper rim which is engaged and closed by a plug-type cover which engages the container rim at both inwardly and outwardly directed shoulders by grooves formed in the cover to prevent accidental dis-

lodgment by sudden application of pressure against the cover.

Steel pails, when filled with paint and the like and closed with conventional covers, usually fail to withstand a drop test of three feet or less. The container of this invention has successfully withstood drops of three to four feet even when the drop has been on the side or on the cover corner. Containers and closures such as are shown in the REED U.S. Pat. No. (3,335,774) above-identified or the YATES U.S. Pat. No. (3,618,802) do not retain their hermetic seal, if they ever had one, when subject to small drops or tipping on their sides.

SUMMARY OF THE INVENTION

This invention may be described, at least in part, by reference to its objects.

It is an object of this invention to provide, and it does provide, a container having its open top formed with a small integrally formed inwardly extending lip and with the lip disposed adjacent the upper edge so as to be engaged by a cover having a recess for an interference fit with this lip. The cover has an outwardly extending flange portion terminating with a downturned annular rim disposed to snugly engage the outer portion of the rim of the container and provide a tension in the cover disposed to retain the cover in its snugly engaged interference fit condition with the inwardly extending lip of the container. The lid also is contoured to provide a plug fit and additional fluid seal at a lower portion of the open top of the container.

It is a further object of this invention to provide, and it does provide, a tapered container disposed to be nested within each other with the outer rim portions engaging each other to prevent a locking together of the nested containers, said container and cover providing a pry slot disposed between the bottom edge of a downturned annular rim of the cover which snugly engages the outer portion of the rim of the container and a shoulder formed on an outer portion of the annular rim of the container.

The plastic pail of the invention, like that in U.S. Pat. Ser. No. 122,303 above-referenced, is contemplated as being of approximately one gallon in capacity but larger and smaller may be furnished. In the molding of these pails having a capacity of 1 gallon a high density plastic such as polypropylene or polyethylene in a thickness of about forty-thousandths of an inch is contemplated as being used. The molded pails or containers are made with a tapered configuration with the upper larger end of the container having a channel-shaped rim which extends outwardly then downwardly from the upper end of the container side wall. The rim is stiffened by a plurality of small ribs extending from the outer rim portion to the sidewall. The upper rim of the container is sized so that as the containers are seated one on top of the other, the sidewalls of the nested containers remain in a spaced condition permitting ready disassembly of the containers one from the other as they are unstacked for filling.

The open top of the container is provided with an inwardly directed retaining ledge which engages a molded notch or groove formed in the cover. This cover has an outwardly extending rim which terminates at a downturned annular flange which snugly slides over and engages an annular rim provided on the molded container. The termination of this rim provides

a pry shoulder spaced from a ring-like molded projection on the outer rim of the container so that the mounted cover may be urged from the container by a pry means.

In all embodiments shown the inward ledge of the container rim or top is sized so as to be a slide fit with a lower retaining ledge providing the lower shoulder of an inner retaining groove formed in the cover. The outward upper edge of the container top is formed with an outwardly extending bead adapted to engage and retain a groove provided in the inner face of the downwardly turned outer flange of the cover. With the cover in an unmounted or relaxed state this groove in the outer flange is a small amount less diameter than is the outer mating diameter bead provided on the rim of the container. As the cover is brought to a mounted condition in and onto the rim of the container a ring portion of the cover is required to be stretched outwardly to slide over and engage this outer bead. As this is occurring the inner retaining groove in the cover is moved into a tight engagement with the inner retaining ledge of the tip rim of the container.

It is therefore a still further object of this invention to provide, and it does provide, a container having an upper rim with both an inner and an outer bead and a complementarily formed cover having inner and outer grooves and with a ring portion extending between the groove portions. This ring portion is stretched a small amount when the grooves of the cover are mounted on the inner and outer bead portions of the container.

In addition to the above summary, the following disclosure is detailed to insure adequacy and aid in the understanding of the invention. This disclosure, however, is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how it may later be disguised by variations in form or addition. For this reason there is shown the specific embodiment of the molded pail or container of U.S. Pat. Ser. No. 122,303 and the plug-type cover as adopted for use with this pail. This embodiment and the four alternate embodiments thereof have been chosen for the purposes of illustration and description as shown in the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a fragmentary sectional side view of the assembly of a container and cover in which the top shoulder surface of the container lies in a flat plane substantially at right angles to the axis of the container and the mating ring-like tension portion of the cover in a relaxed and mounted condition is also formed to lie in a common plane;

FIG. 2 represents a fragmentary sectional side view of the cover and container of FIG. 1 and showing in particular the relationship of the cover to the container in the initial assembly step of mounting the cover in the open top of the container;

FIG. 3 represents a fragmentary sectional side view showing a pair of the covers of FIG. 1 in a stacked condition preparatory to being separated for mounting on a container;

FIG. 4 represents a fragmentary sectional side view of an alternate cover and container preparatory to the mounting of the cover on the container, this container having its top rim conically shaped to present a downwardly and inwardly directed surface tapering toward the bottom of the container, the cover having its mating

ring-like tension portion formed so as to lie in a common plane when in a relaxed condition;

FIG. 5 represents a fragmentary sectional side view of the cover and container of FIG. 4 with the cover disposed in an initial mounting stage or operation;

FIG. 6 represents a fragmentary sectional side view of the assembly of the container and cover of FIG. 4 with the cover now disposed in a fully mounted condition on the container;

FIG. 7 represents a fragmentary sectional side view of yet another alternate configuration of a container and cover in a preparatory or preliminary condition to the mounting of the cover to the container, this container having a generally horizontal top rim like the rim of FIG. 1 and with the cover having its outer ring-like tensioning member formed in a conical shape tapering upwardly and inwardly toward an apex away from the bottom of the container;

FIG. 8 represents a fragmentary sectional side view of the cover and container of FIG. 7 with the cover in its initially mounted condition prior to being mounted in its final condition;

FIG. 9 represents a fragmentary sectional side view of the cover and container of FIG. 7 with the cover mounted to provide a sealed condition;

FIG. 10 represents a fragmentary sectional side view of a container and cover similar to that of FIG. 1 but with the inner bead or lip of the container made with a bifurcated configuration;

FIG. 11 represents an enlarged fragmentary sectional side view showing the detail of the prepared configuration of the bifurcated inner bead of FIG. 10; FIG. 12 represents a fragmentary sectional side view showing the container and cover of FIG. 10 with the cover in the initial step of mounting on the container;

FIG. 13 represents in an enlarged scale a fragmentary sectional side view of the mounted cover and container of FIG. 12 and showing the bifurcated bead in a sealing condition;

FIG. 14 represents a fragmentary sectional side view of a cover and container each having an outwardly extending fin with a reduced area portion at its attaching point, said fins being heat sealed together to form hermetic seal of the contents in the container;

FIG. 15 represents a fragmentary sectional side view of the container and cover of FIG. 14 with the tear-away seal portion separated and partially disassociated from the container;

FIG. 16 represents a fragmentary sectional side view of the container and cover of FIG. 15 with the tear-away seal portion removed and the cover pried from the outer bead or rim preparatory to removal from the container;

FIG. 17 represents a fragmentary sectional view of the extending fin portions just prior to their ultrasonic sealing, and

FIG. 18 represents the fragmentary sectional view of FIG. 17 after the ultrasonic sealing has been accomplished.

In the following description and in the claims various details will be identified by specific names for convenience; these names, however, are intended to be generic in their application. Corresponding reference characters refer to like members throughout the several figures of the drawings.

The drawings accompanying, and forming part of, this specification disclose certain details of construc-

tion for the purpose of explanation of the broader aspects of the invention, but it should be understood that structural details may be modified in various respects without departure from the concept and principles of the invention.

DESCRIPTION OF THE EMBODIMENT of FIGS. 1, 2 and 3

Referring now to the embodiment as seen in FIGS. 1, 2 and 3 it is to be noted that the upper rim portion of a container 20 has an outer rim or skirt portion 22 which joins a horizontal outer upper ring 24 which at its inner diameter forms a ring-like sealing inner member 25 having sharp corners 26 and 27. The outer periphery of ring 24 terminates at an outwardly extending bead 28. Immediately below the inner member 25 there is a wall portion 29 which provides a clearance or recess for the receipt of the cover. This wall 29 extends downwardly to a conically configured portion 30 which extends inwardly and downwardly at a determined angle and distance until it joins the standard tapered portion 32 which forms the side wall of the container. This conically configured portion 30 of the upper side wall extends outwardly at an angle which is greater than the standard taper of the side wall 32. The extending upward wall portion 29 of the container 20 carries the ring-like portion 25 at a position in space which is outward of a continuation of the inner surface of wall 22. This positioning of portion 25 enables several containers 20 to be nested so that the inwardly directed member 25 of one does not engage the outer wall of an upper nested container.

A determined distance down from the upper rim 24 there is formed on the outer rim or skirt 22 a bead portion 34 which provides an upward facing shelf which provides a pry support for the removal of the cover by a sequence to be hereinafter more fully described. Cover 38 is formed with a center disc portion 40 which terminates at a downwardly and outwardly directed tapered portion 42 which at its lower point 44 is redirected upwardly with a more or less semicircular portion to provide a "U"-shaped configuration. The cover then extends upwardly and outwardly as wall 46 to an enlarged outwardly directed lip portion 48. This lip is formed with an outwardly, upwardly substantially sharp retaining edge 50 which engages the underside of ring member 25 to form a seal when the cover is in a mounted condition.

Extending inwardly and upwardly from the retaining edge 50 is an arcuate receiving groove 52 which terminates at an upper ring portion 54 of the cover 38. This upper ring is of a determined width to be hereinafter more fully described. At the outer end of this upper ring 54 is an outer skirt 56 which is formed with a nesting groove 58 at the juncture of the skirt and ring. Immediately below this nesting groove 58 is an inwardly directed cam portion 60 for a purpose to be hereinafter more fully described. As seen in particular in FIG. 3 this cam portion 60 is V-shaped.

Referring now in particular to FIG. 2 it is to be noted that in an initially mounted condition the cover 38 is placed within the open top of the container 20 and the outer diameter of the retaining lip portion 48 is sized so as to just slide by the inner surface of the inwardly engaging retaining ring member 25 formed at the inner rim of container 20. The outer portion of cover 38 is then pressed down so that the cam surface 60 on skirt

56 engages the outer bead 28 of the container 20. The upper rim portion 54 is then pressed downwardly so that the cam portion 60 slides down and over the bead portion 28 to achieve the mounted condition of FIG. 1.

MOUNTING SEQUENCE AND EFFECT OF INSTALLING THE COVER 38 ON THE CONTAINER 20

In the manufacture of the cover and the container the inner diameter of the inner square member 25 of the container 20 is at least no smaller in diameter than the outer diameter of the upper lip portion 48 of the cover 38. This fit is so that the cover may be readily brought to the initial mounting condition of FIG. 2 and when the cover is being removed permits easy removal.

Since the engaging outer lip 48 is no greater than the inner diameter of the ring-like member 25 the cover 38 is readily pressed downwardly into the open top of the container 20 until the outer lip portion has passed below the lower sharp edge 27 and the upper sharp edge 26 has been brought into engagement with the top of the cover portion 54 of the cover. The cam surface 60 is now caused to engage and be slid over the outwardly extending bead 28. As this occurs the upper rim portion 54 of the cover is drawn outwardly and is stretched to provide a determined tension between the outer bead engaging portion 28 and the upper ring-like member 25. The ring-like member 54 of the cover in its stretched condition causes the bead 28 to tightly seat in the receiving groove 58. At this condition the edges 26 and 27 are caused to be forced into the arcuate groove 52 in cover 38 to provide a double engagement and a fluid-tight seal disposed to retain the fluid within the closed container. An additional seal is, of course, provided at the tight engagement of bead 28 and receiving groove 58. Also it is to be noted that where the taper of the wall 46 engages the change of angle in the container wall portions 32 to 30, this portion of the cover engages the container to provide an additional seal.

In its mounted condition as seen in FIG. 1 the V-portion of the cover attached to, and extending outside of, center disc 40 provides a spring or shock member for pressure against the cover so that any dropping of the container which would cause a sudden influx of pressure against the center disc portion 40 of the cover is absorbed by the spring provided by the inwardly directed V-portion of the cover. It is also to be noted that in its mounted condition as seen in FIG. 1 the lower edge of the skirt 56 is a determined distance above the upper edge of the bead 34 which extends completely around the container. Using this space the outer skirt 56 may be pried off the container by placing a screwdriver, a coin or a bladed member between the lower face of the skirt 56 of the cover and the bead 34. It is also to be noted that as depicted in FIG. 3 the outer walls 56 of the covers are tapered. This taper not only assists in the removal of the cover from the mold in its initial molding or manufacturing operation but also provides a shoulder or extending lip from an adjacent cover which permits engagement of the cover by separating means to enable the covers to be separated one from the other when stored in a nested and stacked condition as in FIG. 3.

EMBODIMENTS OF FIGS. 4, 5 and 6

Referring now to FIGS. 4, 5 and 6 it is to be noted that cover 38 is like or identical to the cover 38 described in conjunction with FIGS. 1 and 3 above. A container 61 has a side wall 62 similar to the side wall 32 of the container 20 above. This side wall 62 joins an outwardly directed tapering portion 64 which is at a greater deflection angle. This wall terminates at an inward sealing ring 66 having upper and lower sharp corners 68 and 69 which are similar to corners 26 and 27 shown in container 20 in FIG. 1. An outwardly and upwardly directed conically shaped rim portion 72 is attached to portion 64 and terminates at an outer bead 74. Attached to and extending downwardly from this bead is a wall portion 76 which terminates at an outwardly directed rim support portion 78 whose upper edge provides a shoulder for supporting a prying means for lifting the cover from the container.

Referring now to FIG. 5 it is to be noted that the cover 38 has been moved into a semiclosed condition with bead 74 retained in the recess 58 in cover 38. In this initially mounted condition of FIG. 5, the outwardly directed ring portion 54 of the cover 38 and the inner diameter of ring portion 66 of the container are more or less in coincidence. A cam surface 80 formed on the bottom portion of lip or rim portion 48 permits a downward push upon the inner portion of the cover 38 to cause the lip portion 48 to pass by the inner surface of the ring 66. As the cover is urged further downwardly the rim portion 48 is urged outwardly causing a stretched tension to be formed in the rim portion 54 of the cover 38. This rim as it is stretched brings the lip portion 48 into engagement with the shoulder 66 causing the sharp corners 68 and 69 to engage the groove 52 causing the cover to effect a seal of the cover to the container. In its mounted condition the cover and container will appear as in FIG. 6 with the inner sharp corners 68 and 69 forming a very narrow compressive line of engagement with the arcuate groove 52 formed in the cover and when in engagement provides a double ring sealing means.

CLOSING AND OPENING OF THE COVER 38 AND THE CONTAINER 61

In its closed condition the cover 38 and the container 61 will appear as in FIG. 6 with the sharp edges 68 and 69 being in a sealing condition with the groove 52. The rim portion 54 of the cover 38 has been stretched to the determined extent which is the length of the tapered or conical portion 72. To open the container, a screwdriver, coin or the like is caused to be placed into the space between the cover outer flange 56 and the shoulder portion 78 of the container. The outer flange portion 56 is pried upwardly until dislodged from the outer bead 74 of the container and is locally continued upwardly until the inner ring 66 may be disengaged from the arcuate groove 52 to permit the cover to be removed to the condition as seen in FIG. 4. It is to be noted that the downward slope of the portion 72 of the container establishes a self draining means for directing the paint or the like into the container after the container has been opened and is used as a paint bucket during and for a painting operation.

ALTERNATE EMBODIMENT OF FIGS. 7, 8 and 9

Referring next to FIGS. 7, 8 and 9 it is to be noted that a container 88 is similar to or like the container 20 seen in FIG. 1. The tapered side wall 32 of this container terminates at an outwardly directed tapered portion 30 which extends upwardly to the bead portion 25. The ring portion 24 is horizontal as in FIG. 1 and the outer bead 28 is similar to, if not identical to, that seen in FIG. 1. Below bead portion 28 is formed a wall portion 90 which joins a larger diameter portion 92 which provides on its upper surface a shoulder disposed to assist in the lifting of a cover 94 from its mounted condition on the container. This cover 94 has a mid or central disc portion 96 terminating in the V-shaped spring-like outer portion 98 which is similar to that in cover 38 seen in FIGS. 1, 2 and 3. The outer wall 100 of this V-shaped portion extends upwardly to an outwardly directed shoulder portion 102 which has its lower surface formed to provide a cam. Immediately above this shoulder portion is formed an arcuate groove 104 which in all respects is similar to groove 52 seen in FIG. 3. An outwardly and downwardly directed conical shaped ring portion 106 extends outwardly to an outer rim 108 which has an engaging lip 110 formed on its inner surface. This lip 110 is disposed to fit underneath and snugly engage the bead 28 of the container 88.

In its initially inserted or mounted condition the cover 94 is placed upon the container rim so that it appears as in FIG. 8. In its initially mounted condition the outer bead 28 is brought to a condition above lip 110 on the cover after which the cover portion 106 is pressed downwardly to cause the outwardly directed shoulder portion 102 and its cam surface to slide over the inwardly directed bead 25 so that the conical ring portion 106 is stretched a determined amount and bead 25 enters groove 104 to cause the sharp edges 26 and 27 to engage the inner portions of the arcuate groove 104 to provide a double line seal as seen particularly in FIG. 9.

USE OF THE EMBODIMENT OF FIGS. 7, 8 AND 9

Cover 94 as seen in this embodiment provides an arrangement which is opposite to that seen in FIGS. 4, 5 and 6 in that instead of the container upper rim having a downward slope as in FIGS. 4, 5 and 6 the cover 94 is sloped. The ring portion 106 of this cover 94 is formed conically so that in its free form it is outwardly and downwardly sloped to provide the same mounting action as found in FIGS. 4, 5 and 6 but with an opposite configuration. The cover 94 is placed in position as seen in FIG. 7 with the outer rim portion 108 arranged so that when the cover 94 is pushed downwardly the retaining lip 110 is caused to be slid to and then below the outer bead 28 of the container 88. In this manner the cover is positioned on the container by engagement at its outer edge. This condition of the cover 94 and the container 88 is shown in FIG. 8. When in this position the upper rim 106 is then engaged so that the central portion 96 of the cover may be urged downwardly whereupon the cam surface portion provided on the under portion of the outer shoulder portion 102 is caused to engage the inner bead 25. As the cover and ring portion 106 are pressed further downwardly, the member 102 is caused to slide to and past the inwardly extending ring member 25 to bring the groove 104 into

a nesting and seating arrangement on the ring member 25. A rolling action on the cover is usually utilized to cause the sealing or mounting operation of the cover to the mouth of the container to be achieved so that when finally seated the cover and container are nested as in FIG. 9. Ring member 25 is seated in groove 104 so that the sharp edges 26 and 27 of ring 25 engage the arcuate shaped groove 104 to form two localized ring seals within this groove. The ring portion 106 of the cover is stretched as is portion 54 in the cover of FIGS. 1 and 3. This stretching causes a tension to be developed in the ring portion 106 and insures a seating retension to be developed with the outer bead 28 tightly nested in the recess 108 while ring member 25 is engaged by the arcuate recess 104 at its upper and lower positions.

To remove the cover 94 from container 88, there is required a prying means such as by a screwdriver or coin not shown, which means is caused to enter the slot between the flange 108 of the cover and the protruding ring or rim portion 92 of the container 88 so that by urging the cover upwardly in a localized area the lip 110 is moved over the bead 28 which releases the cover in a localized area after which progressively the cover is lifted from the container. After the outer rim of the cover is released, the ring 25 is disengaged so that the cover may be lifted or removed as in the case of the cover and container of FIGS. 1 and 3.

EMBODIMENT OF FIGS. 10-13

Referring next to the embodiment as shown in FIGS. 10-13 there is depicted a container and cover which are substantially identical to the arrangement as shown in FIGS. 1, 2 and 3. In this embodiment, however, the container, instead of having a single inner ring member, 25 formed as a solid member has instead a bifurcated ring member having an upper portion 120 molded so as to extend inwardly with a V-shape terminating with a sharp protruding edge as particularly seen in FIG. 11. The lower portion of this ring is identified as 122 and is more or less the remainder of ring 25 and is conventionally shaped as seen in FIG. 1 with the exception of the V-shaped groove 123 between portions 120 and 122. This groove provides a V-shaped spring means between the upper and lower portions of this sealing ring. The spring action occurs when the upper portion 120 and the lower portion 122 are urged toward each other when the cover is mounted to the upper rim of the container.

Referring still to the embodiment of FIGS. 10-13 it is noted that the container is conventionally shaped as in FIG. 1 in which the side wall 32 has a normal taper until it reaches the upper conical portion 30 which is similar to that seen in FIG. 1. The intermediate rim portion 24 instead of having an inner lip portion 25 is depicted as in the configuration of FIG. 11 above-described in which the upper portion 120 which is sharply shaped and attached to the rim portion 24 tapers inwardly to a sharp or a nearly sharp edge and in its molded condition the inner edge is more or less planar or lies generally in the same plane as the top surface of the rim portion 24. Slightly outward from the protruding inner edge of triangular portion 120 is the inner surface of the ring portion 122. This ring portion has a sharp lower edge portion 124 which is contemplated to engage the arcuate groove 52 formed in the cover 38 of FIGS. 1 and 10. The outer bead 28 of the rim of this container 20 is formed as in FIG. 1 as is the protruding

pry-rim 34 on the skirt 22 of the container. In all other respects the container 20 and the cover 38 are formed as in FIGS. 1, 2 and 3 as above-described.

ASSEMBLY AND USE OF CONTAINER AND COVER OF FIGS. 10-13

Reference is now made to FIG. 12 wherein the cover is depicted as having been initially pushed into the open top of the container 20. In this inserted condition the outwardly extending upper lip portion 48 of the cover 38 is caused to be pushed below the bifurcated inner engaging rim portions 120 and 122. This is contemplated to be a slide fit and after being placed in this position the outward portion of the cover 38 is pressed downwardly so that the cam portion of lip 59 engages and slides over the outer bead 28 until bead 28 enters the groove 58 of the cover. A rolling, pressing action around the outer rim of the cover is then continued until all portions of the cover are downwardly moved so that bead 28 is caused to fully enter the groove 58. When the cover is mounted the midportion 54 of the cover is stretched as in FIGS. 10 and 13 and when mounted the upper sharp edge 120 is forced inwardly and downwardly against the curved recess of groove 52 and at the same time the lower sharpened edge of 124 of portion 122 engages the lower portion of the arcuate groove 52 so as to be pressed into this groove wall and form a single line engaging seal. In its mounted condition the sharpened edge portion 122 is pressed inwardly and downwardly and the edge portion 122 is urged upwardly by the lower curved portion of groove 52 causing a spring action to be provided by deforming or slightly closing the V-shape in the bifurcated ring member. This thrusting engagement causes lip portions 120 and 122 to be slightly compressed and provides two linear engaging sealing means in the tightly engaged arcuate groove.

To remove the cover 38 from this container the sequence as used in FIGS. 1, 2 and 3, above-described, is employed. In this sequence a pry means or apparatus is placed between the outer skirt 56 and the support shelf 34, after which the cover is pried upward by this pry means to achieve the condition of FIG. 12, after which the cover 38 may be readily removed. In its released condition the lip portion 48 moves inwardly to its initially formed diameter which permits it to readily slide by the inwardly directed edge portions 120 and 122.

EMBODIMENT OF FIGS 14 THROUGH 18

Referring finally to the embodiment of FIGS. 14, 15, 16, 17 and 18 there is depicted a container and cover wherein after the container is filled and the cover is installed the contents of the container may be hermetically sealed. For example, the container and cover of FIG. 10 may be modified to include a tear-away retaining means. As depicted in FIG. 14 a cover 138 is similar in all respects to cover 38 except that to the outer skirt 56 of that cover there is added to cover 138 an outwardly extending fin 150. For a container having a 1-gallon capacity this fin may be about one thirty-second of an inch in thickness and about five-sixteenths of an inch in width. Where this fin joins the flange there is formed a reduced section 152 which is about eight thousandths of an inch in thickness and about ten thousandths of an inch in width.

On a container 156 which is substantially identical to the container 20 of FIG. 10 except for the addition of an additional sealing means there is added to the bead 34 a lower fin 160 which is contemplated to be substantially the same width and thickness as the upper fin 150. This fin 160 is attached to bead 34 with a reduced section 162 which also is about eight by ten thousandths of an inch. In its initially formed condition a small downwardly extending V-shaped sealing assist 164, which may be one thirty-second of an inch at its base and extend downwardly a matter of five thousandths of an inch or so, is formed a short distance in from the outer edge of fin 150. This sealing assist is particularly seen in the fragmentary sectional view of FIG. 17.

When the container has been filled and the cover inserted, the lower fin 160 is contiguous with upper fin 150 and is supported on a portion of an ultrasonic sealing apparatus of conventional design and use. The upper portion of the sealing apparatus engages the fin 150 so that the V-shaped assist 164 is joined to the lower fin 160 at the area corresponding to the assist 164. This joined area is best depicted in FIG. 18.

After purchase by the customer this hermetically sealed container of FIG. 14 may be opened by grasping the sealed fins 150 and 160 at a transversely scored portion, not shown, so as to permit the protruding fins to be separated on a more or less radial line. After this separation, the assembled fin which, for convenience is identified as 170, is pulled from the cover and container with the weakened areas 152 and 162 permitting separation as seen in FIG. 15. After the assembled fin, 170 has been removed and discarded, the container is opened by a pry action as in FIG. 1 with the released cover appearing as in FIG. 16. At this stage the container and cover are substantially like that in FIGS. 10-12. Reclosing is as described in FIGS. 10-12 above.

OPERATION AND USE OF THE CONTAINERS AND COVERS

AS SEEN IN THE ABOVE FIVE EMBODIMENTS

In all of the above-shown and-described embodiments the covers are depicted as having a V-portion which permits the cover to have a certain amount of resilience or spring to accommodate sudden forces exerted on its inner portion. This V-shaped spring means prevents the dislodgment of the tensioned ring portion from the top of the container and the sharp inwardly extending engaging lip is retained in grooves 52 or 104. In all cases it is contemplated that the inner rim of the container as members 25, 66 and 120 has its diameter as great or greater than the corresponding outer diameter of the shoulder portions 48, 66, and 102 of the cover when in an unmounted condition. For example, shoulder 48 in FIG. 2 is a slip fit with inner member 25. In its mounted condition the ring-like member 54 or 106 of the cover is stretched a determined amount to insure that accidental dislodgment of the cover does not occur with the dropping of the container filled with paint or the like from a height such as 3 or 4 feet. It is also to be noted that the upper receiving groove in the outer flange of the cover is a determined extent lesser in diameter than the mating protruding bead on the container. The space below the mounted cover's outer skirt and rim bead of the container provide a pry space for apparatus such as a screwdriver or a coin which is

manipulated to cause the cover to be locally dislodged, after which the continued pry action around the outside of the container establishes a separation of the cover from the container. In all the embodiments a sharp upper and lower edge is provided on the inwardly extending retaining ring or lip of the container. The stretched ring-like portions 54 and 106 of the cover in its mounted condition insure that these sharp edges engage the arcuate surface 52 to provide a double seal. The sharp edges of this ring, as they are urged to and into a comparatively smooth surface, cause the sharp edges to be deformed slightly to provide a ring-like narrow width pressure tight seal. In all cases the underside of the upper outwardly directed lip portions 48 and 102 of the cover are contoured so as to be cammed downwardly over the inwardly extending bead of the container. This cam assist is usually unnecessary since these lips of the cover and the engaging lip of the container are sized so that in a relaxed condition they are substantially in coincidence or there is a small amount of clearance to permit the cover lip to pass the lip of the container.

As reduced to practice it has been found that material for the cover and the container is preferably of a high density or oriented polypropylene or polyethylene which provides a substantial rigidity to both the cover and container. This material is of a thickness which permits a small amount of stretching of the cover to occur to cause the tensioned seal to be affected and maintained. Such a cover is contrary to the cover normally provided for containers such as Tupperware (TM) whereby the cover is made of a very resilient or very flexible plastic enabling these covers to be rolled or snapped on to the top of the container. This situation is not found in the containers or covers as shown and described above.

In all cases it is contemplated that the upper rim of the container will be formed with or without reinforcing rib portions so that this rim, with or without a mounted cover, will retain its moulded size. The covers, however, are constructed so as to be able to be stretched to provide the desired tension to the engaging portions of the mounted cover to the container.

In the embodiments of FIGS. 4, 5 and 6 it is contemplated that an alternate cover may be molded so that in its free condition the ring portion 54 is sloped to the same or nearly the same degree as the conically shaped rim portion 72 of the container. Such a cover would appear with a configuration as is shown in FIG. 6. In a like manner the rim portion 24 of the container 88 of FIGS. 7, 8 and 9 may be alternately formed with an upward and inward slope which conforms to the slope of the cover 94 as seen in FIG. 7. Figures depicting these alternate constructions as herewith noted have not been provided as such is not believed necessary. These alternate configurations of the cover and container are believed sufficiently identified and described by reference to the suggested alternate configurations of the cover and container as shown in FIGS. 6 and 7.

The above description has suggested sizes and thicknesses which have been primarily and satisfactorily used for 1-gallon containers. Containers for 1 quart, 2 quarts, 2 gallons, 2½ gallons and 5 gallons are also quite common and with these different sizes and others not noted the sizes and thickness of the plastic molded components are changed as required. In all cases the inner and outer retaining ring portions (i.e., 25 and 28

of FIG. 1) of the container will be larger than the mating portions of the cover in its relaxed condition. The outwardly directed ring (i.e., 48 of FIG. 1) of the relaxed cover is a slide or slip fit with the ring portion (25) of the container to insure easy mounting and removal. This concept is carried to the other container and cover combinations for the other size containers.

Terms such as "left," "right," "up," "down," "bottom," "top," "front," "back," "in," "out," and the like are applicable to the embodiments shown and described in conjunction with the drawing. These terms are merely for the purposes of description and do not necessarily apply to the position in which the container and plugtype cover may be constructed or used.

While particular embodiments of the container and cover have been shown and described it is to be understood the invention is not limited to these particular embodiments since modifications may be made within the scope of the accompanying claims and protection is sought to the broadest extent the prior art allows.

What is claimed is:

1. A plastic container and a mating plug type cover which is disposed to be mounted in an open top of the container to retain a contained fluid and the like in a fluid tight, sealed condition, said container and cover in combination including: (a) a container having an open top formed with an outwardly extending rim, said container having an upwardly and outwardly tapered upper inner wall portion terminating at an inwardly directed bead at the upper inner edge of the rim, said bead having upper and lower substantially sharp edges and with a determined diameter of close tolerance; (b) a ring-like portion extending outwardly from the inner bead and forming the upper surface of the rim and terminating at an outwardly extending upper bead; (c) an annular outer, wall-like, flange integrally attached to the outer edge of the ring-like portion of said rim, said flange of a lesser diameter than the outwardly extending bead and extending downwardly from said ring-like portion, said flange having at a determined distance below said upper bead a lower outwardly extending shelf means providing an upwardly facing support means; (d) a cover of plastic material having a determined elastic property and having a recessed inner portion whose outer face is a conical configuration sized so as to nest within and engage the outwardly tapered upper inner wall portion of the container opening; (e) an inner receiving groove formed at the upper extent of said conical configuration and next to a planar, ring-like portion extending outwardly and forming the top portion of the cover, said groove disposed to engage and retain the upper and lower sharp edges of the inwardly directed bead of the container rim when the cover is in a mounted condition, the lower portion of said groove terminating at an outwardly directed lip whose outer diameter with the cover in an unmounted condition is not greater than the diameter of the inwardly directed bead of the container, and (f) a downwardly extending outer skirt, integrally connected to the outer extent of said planar portion of the cover and at this juncture having a nesting groove disposed to snugly engage the outwardly extending upper bead of the container rim, said skirt having an inwardly directed cam portion forming the lower portion of said nesting groove, the annular skirt sized so that its inner surface will snugly engage the annular flange of the rim

of the container and as the cam portion is moved to and past the upper outwardly bead and the bead is engaged said planar cover is outwardly displaced to provide a tensioned condition in the planar member and to maintain the inner bead of the container rim in the cover groove during the time the outer annular skirt of the cover is in snug engagement with the annular flange of the container rim and the upper outer bead of the container is retained in the outer nesting groove in the cover and with the lower edge of the skirt of the cover in its mounted condition positioned from the shelf means on the container flange so as to provide a space therebetween sufficient for the insertion of a pry means by which the cover may be locally pried from the container rim.

2. A container and cover as in claim 1 in which the inner receiving groove formed in the cover is arcuate in configuration and in which the outwardly directed lip forming the lower portion of the groove has its lower portion formed with a taper to provide a cam means adapted to assist the entering of this cover lip portion into the central portion of the container and below the inner bead forming the upper inner edge of the container open top.

3. A container and cover as in claim 2 in which the outwardly extending upper rim of the container lies in a common plane as does the planar ring-like portion forming the top portion of the cover.

4. A container and cover as in claim 1 in which the outwardly extending upper rim of the container is conically shaped with the rim tapering inwardly and toward the bottom of the container while the planar ring-like portion forming the top portion of the cover lies in a common plane.

5. A container and cover as in claim 1 in which the outwardly extending upper rim of the container is conically shaped with the rim tapering inwardly and toward the bottom of the container and with the planar ring-like portion of the cover tapered in a substantially like degree and manner.

6. A container and cover as in claim 1 in which the outwardly extending upper rim of the container lies in a common plane while the mating cover has its planar ring-like portion formed in a conical configuration which slopes outwardly and downwardly from its axis.

7. A container and cover as in claim 1 in which the outwardly extending upper rim of the container is conically shaped with the rim tapering outwardly and downwardly toward the bottom of the container while the mating cover has its planar ring-like portion formed with a substantially like conical configuration which also slopes outwardly and downwardly.

8. A container and cover as in claim 1 in which the inner receiving groove formed in the cover is arcuate in configuration and in which the inwardly directed bead in the container which engages and seats in this groove is bifurcated to provide an upper V-shaped member whose wedge shape provides a thin inner edge while the lower portion provides a sharp engaging edge, the bifurcated construction providing a spring means to permit the upper and lower edges to tightly seat in the arcuate groove.

9. A container and cover as in claim 8 in which the upper sharp edge member extends inwardly a small amount more than the lower rim portion which is more substantial and with the bead in its mounted condition

15

the upper sharp edge forms a sealed edge which is forced inwardly and downwardly in the groove and toward the lower rim portion.

10. A container and cover as in claim 1 in which the cover is formed with an attached outwardly extending fin secured to the outer skirt of the cover by means of a reduced section to provide a tearaway attachment, and in which the container is formed with an attached like fin secured to the outer flange of the container by means of a reduced section to provide a tear-away attachment, the fins of the cover and container disposed to lay adjacent each other, the fins disposed to be sealed together to provide a hermetic tearaway sealed

16

unit.

11. A container and cover as in claim 10 in which one fin is formed with a small V-shaped sealing assist extending upwardly from a sealing surface adjacent the other fin said assist being useful in ultrasonic sealing.

12. A container and cover as in claim 1 in which the outer skirt of the cover is made with a taper so that the lower edge of the skirt extends outwardly of the upper edge so that with the covers in a stacked condition one cover may be readily separated from the stack by edge engaging means.

* * * * *

15

20

25

30

35

40

45

50

55

60

65

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,817,420 Dated June 18, 1974

Inventor(s) Raymond A. Heisler

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet insert -- The portion of the term of this patent subsequent to Jan. 1, 1990, has been disclaimed. --

Signed and sealed this 31st day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents