

June 30, 1964

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3,139,210

THREADED-TOP CONTAINER WITH MOLDED IN SITU THREADS

Filed June 28, 1962

Fig. 1.

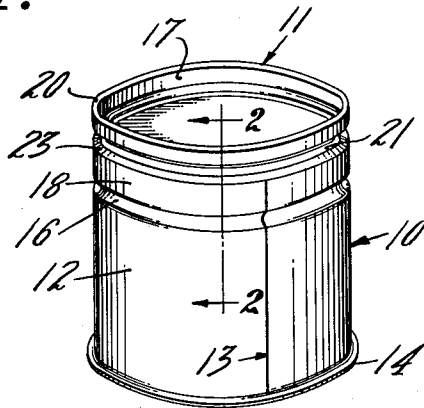


Fig. 4.

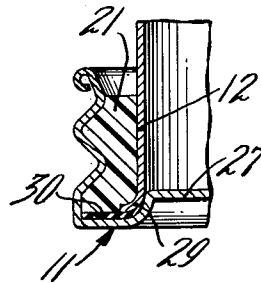


Fig. 3.

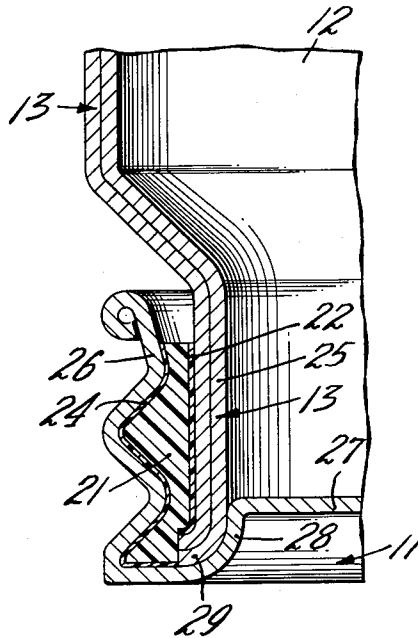


Fig. 2.

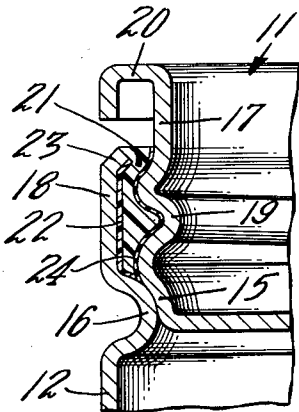
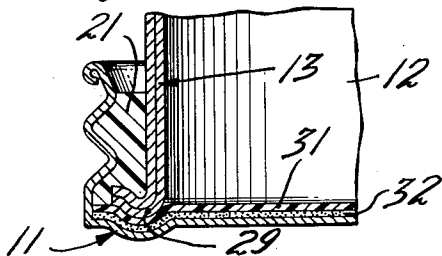


Fig. 5.



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3,139,210

THREADED-TOP CONTAINER WITH MOLDED IN SITU THREADS

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Filed June 28, 1962, Ser. No. 206,034

7 Claims. (Cl. 220—39)

This invention relates to screw-cap containers, and more particularly to a construction of a metal can wherein a threaded closure is provided at one end of the can body by a ring of resin plastic which is molded in situ to form cooperating threads when congealed.

Screw-cap receptacles and containers of many types are available in the prior art. Earthen ware containers, such as glass jars, as well as certain plastic and metal containers are common examples of screw-cap constructions having desirable easy open and reclosure features. Attempts to adapt the threaded closure construction to containers of the type used for packaging processed products and for products requiring good hermetic qualities have met with problems. Among the problems encountered has been wide manufacturing tolerances making it difficult to achieve an effectively tight threaded closure without selectively fitting the parts. A similar problem is the lock-and-lap side seam present in conventional metal can body constructions which aggravates the difficulty of effecting a hermetic seal in the threaded closure joint in metal cans. Also, thin metal cans having preformed threaded parts are difficult to assemble in high speed operation, and it frequently happens that the threaded end seizes to the body due to excessive assembly torque and is thereafter difficult to open. Another and perhaps greater problem is that of providing a threaded closure which will withstand the elevated temperature and pressure conditions present when used for products which are processed after filling, i.e., sterilizing, pasteurizing, and other post-closure treatments. A satisfactory solution to these many problems has long been sought by the manufacturers and users of hermetic containers having a reclosure feature and especially in metal cans and glass jars where the containers themselves are subjected to a processing environment.

An object of the present invention is the provision of a screw-top container construction which overcomes the problems heretofore confronting the prior art.

Another object of the invention is the provision of a container having a reclosable threaded closure which preserves its sealing qualities even when subjected to the environmental conditions of processing.

Another object of this invention is the provision of a threaded closure container construction which ensures effective hermeticity notwithstanding loose dimensional tolerances on the interfitted parts and/or the presence of discontinuities, such as occasioned by conventional side seams in metal cans, in the threaded area.

Another object of this invention is the provision of a threaded closure container which is simple in construction, easy and inexpensive to manufacture, provides hermetic sealing for prolonged periods of time, and is easily opened and reclosed.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

In carrying out these objects, there is provided a reclosable container comprising a tubular body, a screw-cap closure removably secured to one end of the body with the threaded skirt of the closure being disposed

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concentrically of and spaced from a corresponding portion of the body wall, forming therewith a space or channel, and a ring of congealed-liquid material molded in situ in the channel adhering to the body wall and forming corresponding threads with the threaded skirt of the closure to seal the body and closure together and provide means for easy opening and reclosure.

Referring to the drawings:

FIGURE 1 is a perspective view of a container incorporating the instant invention;

FIG. 2 is a sectional view taken substantially along line 2—2 of FIG. 1;

FIG. 3 is a sectional view similar to FIG. 2, illustrating an alternate embodiment of the invention.

FIG. 4 is a fragmentary sectional view of another embodiment of the invention; and

FIG. 5 is a fragmentary sectional view of still another embodiment of the invention.

As a preferred or exemplary form of the invention, FIG. 1 illustrates a metal container generally designated 10 comprising a threaded cap 11 secured within one end of a tubular body 12. Body 12 may be of any size and configuration common in thin wall metal cans, either circular, rectangular or obround in cross section but with a round end for receiving cap 11, and may be formed in a conventional manner with a lock-and-lap side seam 13 extending longitudinally of its wall. The opposite end of the body may be flanged as at 14 to receive a metal end (not shown) which is ordinarily shipped with the finished container and assembled by the packer after filling with the product.

As shown in FIG. 2, cap 11 fits within the open end of the body 12 and has an inner peripheral shoulder 15 which seats against and frictionally engages an annular groove 16 formed in the body wall a predetermined distance from its end. The peripheral wall or skirt 17 of the closure lies concentrically within and spaced from a corresponding wall portion 18 of the body above groove 16, these elements thereby forming a channel closed at one end by the engaging surfaces of shoulder 15 and groove 16. Skirt 17 is provided with a continuous thread 19 which may be rolled or otherwise formed in the manufacture of the cap itself. The cap may be provided at the outer end of skirt 17 with a bead 20 which serves to stiffen the cap and provide a hand-grip surface for effecting rotation.

The channel between skirt 17 and wall portion 18 is filled with a congealed-liquid material, preferably a resin plastic, which, in its solid state, forms a threaded ring 21 conforming exactly to closure thread 19 and wall portion 18. By congealed-liquid resin is meant an initially liquid, organic chemical composition which, upon the application of heat and after a period of cooling, sets up or cures to a solid, substantially rigid elastomeric state. The finished congealed-liquid resin is a plastic composed essentially of natural or synthetic organic polymers, preferably the latter.

The instant invention contemplates the use of those materials which are readily flowable in their liquid state so that surface irregularities, such as occasioned by the presence of side seam 13 extending into the seal area, will be completely and effectively sealed, and which preferably undergo little or no shrinkage in solidifying so that congealed ring 21 retains its tight conformity with the respective metal surfaces in the seal area. Also, where the containers are to be used for products requiring some post-closure processing, such as sterilizing, pasteurizing, etc., an essential requirement of the selected ring material is that it be capable of withstanding the environment to which the containers are normally subjected in processing. That is, ring 21 must not be deleteriously affected by ele-

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vated temperatures and pressures or by exposure to heated water or steam used in the treatment.

Polyvinyl chloride plastisol fairly well satisfies these requirements since it is a resin which undergoes very little shrinkage in congealing and softens only slightly at those temperatures normally encountered in processing. Other plastics, such as epoxy and phenolic resins, as well as certain easily fusible metals, such as Wood's alloy, Rose's alloy, etc. have even higher softening points and may be used in certain instances where desired. The melting or softening points of these materials range between 275° F.-620° F. and are therefore fully capable of maintaining an effective seal even when exposed to elevated processing temperatures. It will also be understood that many other types of resins and resinous compositions may be used where the canned contents are not to be processed or where the requirement against shrinkage is less severe. Polyethylene, polypropylene, vinyl chloride-vinyl acetate copolymers, neoprene rubber, and certain amine cured, glue-glycerin formulations are just a few of the many materials which may be satisfactory for ring 21 in these latter circumstances. Even though many of these latter materials may undergo some shrinkage when cooling to a solid state, a slight turn of the cap 11 after ring 21 has solidified will compensate for most of this shrinkage and result in an adequate seal.

When the cap and body are properly associated and the liquid resin injection molded or otherwise placed in the channel defining the seal area, the container is then passed through an oven or other suitable heated environment for effecting a curing cycle, which in the case of plastisol may be at a temperature in the neighborhood of 350° F. to 410° F. for approximately two to three minutes followed by a period of cooling. Thus, there is provided a threaded closure wherein the threaded engagement between the container elements is provided by a resin ring which is molded in situ or formed in place to a custom or tailored fit coincidentally with the assembly of the elements.

To ensure proper functioning of the resulting threaded joint, the inner surface of body wall portion 18 may be coated with a thin layer 22 of adhesive material, such as a vinyl resin, prior to molding ring 21 in place to promote adhesion of the plastisol ring to the body wall. In addition, the edge of wall portion 18 may be turned in as at 23, either as a continuous annular lip or at spaced intervals about the body wall, to more effectively secure ring 21 against slippage or translation with respect to body 12. To ensure that ring 21 does not seize or adhere to closure 11 but enables proper and easy rotation, the exterior surface of skirt 17 may be coated with a thin layer 24 of an adhesion-preventing material, examples being a resin with silicone as one of its components or other types of compositions which do not readily adhere to the material of which ring 21 is formed.

FIG. 3 illustrates an alternate embodiment of the invention, with the parts assembled in somewhat reverse order. In this case, body 12 is necked-in as at 25 for a predetermined distance contiguous its end to fit concentrically within end cap 11. In this embodiment, cap 11 has a threaded skirt 26 which encloses the necked-in portion 25 of the body to form the annular channel for receiving the molded ring 21. The cap is provided with a recessed central portion 27 defined by an annular arcuate wall 28 which frictionally engages and seats within a rounded lip 29 formed at the end of necked-in portion 25.

Shown clearly in this view is the conventional side seam 13 extending fully into the seal area and being completely immersed in the congealed-liquid material forming ring 21. Because of the ability of the material to flow freely around seam 13 before it congeals and fully seal any interstices present therein, it will be appreciated that the seam at this end of body 12 may consist of several thicknesses of interfolded metal without affecting the quality of the seal. If desired, the portion of seam 13 may be a fully

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locked construction instead of the simple lap present in flange 14 which ordinarily is kept to a minimum thickness for double seaming to a metal end. As in the preferred embodiment, the vinyl coating 22 and silicone coating 24 may be applied on the corresponding surfaces of body 12 and skirt 26, respectively, to ensure proper functioning of the closure.

FIGS. 4 and 5 illustrate two other modified embodiments of the invention. As shown in FIG. 4, the preformed cap 11 may be provided with an annular gasket 30 which is molded into the cap prior to assembly to body 12 and injection of the material forming threaded ring 21. The gasket 30 may be any suitable sealing compound, such as resin or rubber formulations, and may be coated with a suitable release agent on its surface forming the interface with ring 21 to prevent adhesion thereto. This form of the invention provides excellent reclosure sealing and has particular utility in those instances where the selected material for ring 21 is prone to slight shrinkage upon congealing and cap 11 requires a slight twist after ring 21 has set to effect an adequate seal.

The construction shown in FIG. 5 may be used for packaging whole blood, plasma or other types of intravenous products. In this modification, a diaphragm 31, which may be a plastisol similar to ring 21 or other suitable impervious plastic material, is formed within cap 11 to cover its entire inner surface except for skirt 26. The diaphragm 31 may be applied as a liquid and cured within the cap, but the interface surface is treated or coated with a suitable release agent 32, such as a thin coating containing a silicone component, to prevent adhesion to the inner surface of the cap. The peripheral margin of the diaphragm contacting body flange 29 and molded ring 21 is not treated so that it adheres and is firmly bonded thereto. When cap 11 is removed, diaphragm 31 remains secured to body 12 and is pierced with a hypodermic needle or like instrument to extract the product.

Although the constructions of threaded closure containers hereinabove described contemplate having the cap 11 as the preformed threaded member, it will be understood that it is within the purview of the present invention to reverse this operative association so that end portion 18 or necked-in portion 25 of the body itself is the threaded member and ring 21, in turn, is secured to a generally cylindrical skirt on cap 11. The threaded cap construction is preferred, however, where body 12 embodies side seam 13 or is otherwise of a material or construction not readily threaded.

There is thus provided a screw-cap container construction having the advantages of easy open and reclosure features and yet which provides effective hermeticity for prolonged periods and even after repeated use, notwithstanding discontinuities and dimensional irregularities in the cooperating parts and the extreme conditions to which the container may be subjected in processing its contents. Although metal cans and particularly those for products requiring post-closure processing have been described as a principal use for the present invention, it will be understood that its utility extends as well to glass and fibre containers and to containers with and without side seams.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A reclosable container comprising a tubular body having one end adapted to receive a permanent end panel, a rotatable closure removably secured to the other end of said body and having a skirt disposed concentrically

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of and spaced from a corresponding wall portion of said body, said body and said closure being in frictional engagement at one end of said skirt and spaced part at the other end to form an annular channel therebetween, said channel being defined by concentric walls consisting of said skirt and said body wall portion, one of said channel walls having a continuous thread formed therein and the other of said channel walls being unthreaded and an elastomeric congealed-liquid resin plastic ring molded in situ in said channel and being contiguous with said channel walls, said ring being bonded to said unthreaded channel wall and forming with said threaded channel wall cooperating threads for effecting opening and closing of said container.

2. The container of claim 1 wherein said body wall portion is formed with a lip extending into said channel but short of said skirt to secure said ring against translation.

3. The container of claim 1 wherein said congealed-liquid plastic resin is a polyvinyl chloride plastisol.

4. The container of claim 1 wherein the surface of said unthreaded channel wall is coated with an adhesive resin plastic for bonding said resin ring thereto.

5. The container of claim 1 wherein the surface of said threaded channel wall is coated with a thin layer of adhesion-preventing material to prevent seizure between said threaded channel wall and said resin plastic ring.

6. A reclosable container comprising a tubular metal body having one end adapted to receive a permanent end panel, a screw-cap closure removably secured within the other end of said body and having a skirt with continuous threads therein, said body having an annular, inwardly-projecting rib disposed a predetermined distance from said other end providing a seat for said closure and a

5 wall portion concentrically enclosing but spaced from said skirt to define an annular channel therebetween, said wall portion being interiorly coated with a thin layer of vinyl resin and said skirt being exteriorly coated with a thin layer of resin containing a release agent, and a congealed plastisol ring molded in situ in said channel and forming cooperating threads with the corresponding threads in said skirt, said ring being bonded to said wall portion by said vinyl resin layer and maintained free of adhesion to said threaded skirt by said resin layer containing said release agent.

10 7. A reclosable container comprising a tubular metal body having one end adapted to receive a permanent end panel and the other end being necked in to a smaller diameter, a screw-cap closure removably enclosing said necked-in end, said cap having a skirt with continuous threads formed therein concentrically enclosing but spaced from the corresponding wall portion of said necked-in end, the edge of said necked-in end being formed in a lip to provide an annular seat for said closure, said wall portion being exteriorly coated with a thin layer of vinyl resin and said skirt being interiorly coated with a thin layer of resin containing a release agent, and a congealed plastisol ring molded in situ in said channel and forming cooperating threads with the corresponding threads in said skirt, said ring being bonded to said wall portion by said vinyl resin layer and maintained free of adhesion to said threaded skirt by said resin layer containing said release agent.

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