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CONTAINER AND CLOSURE CAP THEREFOR

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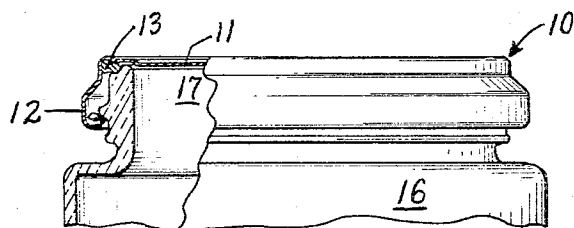


Fig. 1.

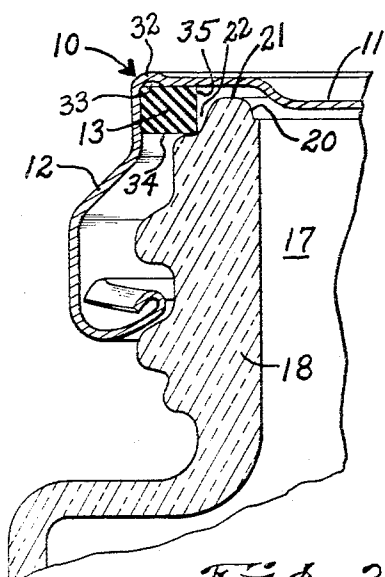


Fig. 3.

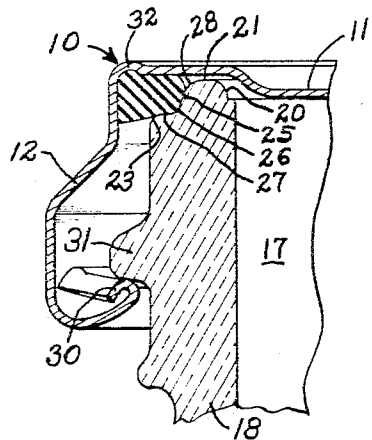


Fig. 4.

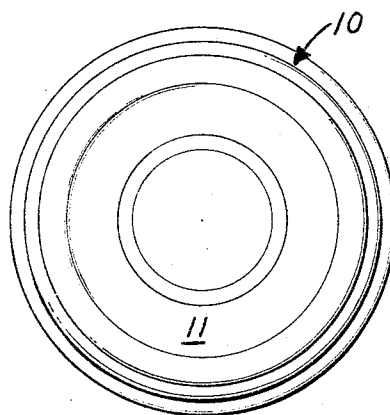


Fig. 2.

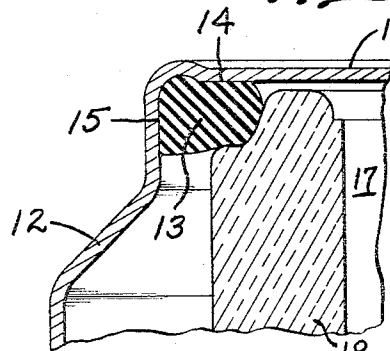


Fig. 5.

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CONTAINER AND CLOSURE CAP THEREFOR

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Continuation of application Ser. No. 83,683, Jan. 19, 1961. This application June 23, 1964, Ser. No. 386,479

1 Claim. (Cl. 215-40)

This application is a continuation of a co-pending application Ser. No. 83,683, filed Jan. 19, 1961 and entitled, Container and Closure Cap Therefor and is now abandoned.

This invention relates generally to containers and closure caps for hermetically sealing the same and more particularly to a novel container and closure cap combination, which, while providing an effectively sealed package, may with relative ease be opened by the consumer.

In the packaging of various food commodities, baby foods, for example, containers for the same, such as glass jars are hermetically sealed by means of closure caps which provide side and/or top seals and are removably held upon the jars by cooperating screw-threads or lugs, or possibly by means of "side seal" gaskets interposed between the closure cap skirts and external side sealing surfaces of the containers, such serving to frictionally retain the closure in place.

Although the side-seal, "press-on" type of closure cap possesses numerous important advantages, including ease of application at extremely high speeds and excellent sealing qualities, it nevertheless has met with serious widespread objections on the part of the housewives and others because of the difficulty experienced in removing the cap and the fact that such removal generally deforms the cap to an extent that it cannot be used as a reseal. Hence screw or lug-type closure caps are returning to favor.

These screw or lug-type closure caps, after serving as the primary or initial sealing means, may be utilized to "reseal" jars containing the unused portions of the food commodity. A serious objection to conventional closure caps of this type, which in the past have been and are today being offered to the trade, is the difficulty of removing them, if initially they have been so affixed to the containers as to positively insure reliable hermetic sealing. Easy removal is, of course, attainable without difficulty if absolutely reliable sealing qualities are sacrificed and given little weight, since in such circumstances the closure caps may be applied under low torque and therefore will offer minimum resistance to manual rotation for removal purposes. With the conventional screw or lug-type closure cap, however, application of same under sufficient torque to create a satisfactory seal which will withstand pressures developed during retorting and the many accidental impacts received in handling of the package from the packer to the customer, also requires the exercise of much greater force for removal than the average housewife consumer has at her command. Thus both types of present day closure caps on the one hand possess certain distinct advantages but on the other, are objectionable.

An important object of our invention therefore is the provision of a container and screw, or lug-type, closure cap combination, in which a sealing gasket and those portions of the closure cap and container intimately asso-

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ciated with it are so formed and proportioned as to create a perfect primary hermetic seal with the application of moderate torque, hence providing relatively easy cap removal.

Another object of our invention is the provision of a container, a glass jar, for example, in which the mouth-forming wall has its outer corner cut away so as to provide not only a novel and efficient type of sealing surface but also closure cap centering and guiding surface, designed to insure accurate initial positioning of the closure caps. Thus "cocked" caps, "cross-threading" and resultant defective container seals are avoided.

It is also an object of our invention to provide a container and screw, or lug-type closure cap combination in which surfaces contacted by a sealing ring are such that the top pressure required to effect adequate gasket compression and satisfactory sealing is held to a minimum thereby reducing both the necessary closure cap application and removal torque.

Likewise it is an object of our invention to provide a glass jar or the like container in which the mouth forming neck incorporates a novel sealing surface having the important function of guiding an accurately centering a closure cap just prior to threading it onto the jar.

A further object of this invention is the provision of a container and screw or lug-type closure cap combination which will withstand the pressures during retorting and the many accidental impacts which it may receive without breaking the seal and at the same time permit easy removal of the closure cap.

These and other objects and advantages will become apparent from a reading of the following detailed description taken in conjunction with the accompanying drawing in which:

FIGURE 1 is an elevational view, partly in section, of the closure cap and container embodying our invention;

FIGURE 2 is a top plan view of the closure cap and container of FIGURE 1;

FIGURE 3 is an enlarged fragmentary sectional view of our closure cap and container with the cap and gasket accurately positioned preparatory to threading the closure cap onto the container;

FIGURE 4 is an enlarged fragmentary sectional view of our closure cap and container with the closure cap in sealing position on the container; and

FIGURE 5 is an enlarged view similar to FIGURE 4 showing more clearly the important sealing and cap centering surfaces of the container.

In brief, our invention contemplates a container and closure cap for hermetically sealing the same. The closure cap comprises a disk-like panel, an annular attaching skirt at the periphery of the panel, and an annular rubber-like sealing gasket. The sealing gasket is disposed internally of the closure cap and is contiguous with the panel and skirt. The container is formed with a cylindrical mouth-defining neck and an annular sealing surface about the outer corner of the neck at its free end. Interengageable means are provided on the closure cap and neck for separably connecting them. This connection is accomplished by rotation of either the cap or container with respect to the other. The annular sealing surface of the container is constructed and arranged to contact only a portion of those surfaces of the gasket which are not contiguous with the closure cap. This arrange-

ment as will be apparent hereinafter produces high localized stresses in those portions of the gasket contacted by the annular surface.

It was surprisingly found that this combination not only produced a very effective hermetic seal but involved such low application torque that the resultant removal torque was so low that the seal could be broken by the average housewife. This result is in direct contradiction to all known prior art combinations which also used annular rubber-like sealing gaskets. After the invention of this combination, it was compared with closure cap and container combinations of the prior art.

Referring now to the drawings which illustrate a preferred embodiment of our invention, the combination comprises a sheet metal closure cap 10 having a generally flat disk-like panel 11 and an annular depending attaching skirt 12 at the periphery of the panel 11. An annular rubber-like sealing gasket 13 is disposed internally of the cap 10. It is of a generally rectangular cross section with two of its adjacent surfaces 14 and 15 contiguous with the panel 11 and skirt 12, respectively and adhesively or otherwise bonded thereto.

The container may well be a glass jar 16 having a mouth 17 defined by a cylindrical neck 18. The outer or free end 20 of the neck 18 is provided with an annular relatively flat rim 21 adjacent to the mouth-opening. An annular sealing gasket accommodating channel 22 is provided in the outer corner of the neck 18 adjacent the rim 21 thereof.

This channel 22 comprises an inner generally frusto-conical wall 25 extending axially inwardly and upwardly from its base end near the floor 27 of the channel 22 to an annular convex surface 28 of short radius at the rim 21. The wall 25 is disposed at an angle of about 25 degrees plus or minus approximately 10 degrees to the axis of the neck 18. The floor 27 is an annular surface of narrow width which merges through a short radius or concave surface 26 with the base end of the frusto-conical wall 25. A second or outer short radius or convex surface 23 is spaced outwardly from and in a plane below the concave surface 26. The convex surface 23 merges along one margin with the exterior surface of the neck 18 and along the other margin with the floor 27. The just described frusto-conical wall 25, floor 27 and curved surfaces together provide the sealing surface for contact with the gasket 13.

If desired, the closure cap panel 11 may be deformed at its periphery to provide an upstanding hollow annular rib 32. The channel 33 formed by said rib 32 is not filled with the gasket 13 during placement of the same in the closure cap. It is only upon application of the closure cap to a sealing position on the container 16 that the gasket flows into this channel. This ability to flow reduces slightly the compression on the gasket 13 thereby contributing to lowered removal torque for the closure cap 10.

Interengageable means are provided on the closure cap 10 and the neck 18 for separably connecting them by rotation of one with respect to the other. They comprise, in the illustrated embodiment, conventional lugs or screw threads 30 on the lower margin of the skirt 12 of the closure cap 10. Upon application of the cap 10 to the container 16 they are brought into holding engagement with lugs or screw-threads 31 on the neck 18 of the container 16.

The gasket accommodating channel 22 with its frusto-conical wall 25 insures accurate initial positioning of the caps upon the containers as to practically preclude any "cocking," "cross-threading," etc. of the caps. Such "cocking" etc. almost invariably result in imperfectly sealed containers and often in no seal at all.

Rotation of the cap 10 onto the container 16 or possibly rotation of the container relative to the cap causes the cap to move axially with respect to the container into

effective sealing position. The described annular sealing surface contacts and compresses the rubber-like gasket 13 to provide the desired seal. The above described novel sealing surface is so constructed and arranged that it contacts only a portion of those gasket surfaces which are not contiguous with the panel 11 and the skirt 12 of the cap 10. This minimum amount of surface contact between the sealing surface and the gasket 13 causes the lower non-cap-engaging surface 34 of the gasket to flow upwardly and inwardly with respect to its original position and thus prevents flow of the gasket 13 below the convex surface 23 which would result in binding of the closure cap. At the same time this minimum contact produces high localized stresses in that portion of the gasket 13 contacting the sealing surface.

The above combination produces an effective seal which will prevent the entrance of any air into the container during processing, handling and storage. It also provides a minimum of space between the panel 11 and rim 21 thereby insuring a minimum of contact between the gasket 13 and the contents of the container. At the same time, the torque required to break this seal and remove the cap is relatively low. That is, it is low enough that the average housewife may remove the same without the use of special tools or other implements.

It was surprisingly found that if the sealing surface formed by the walls of the channel was constructed and arranged in such a fashion that it contacted approximately one half and preferably less than one half of the non-cap-engaging surfaces 34 and 35 of the gasket 12 and at the same time caused the lower surface 34 of the gasket to flow only upwardly and inwardly with respect to its original position that the torque required for removal was approximately one half of that of the prior art caps. In addition, it is necessary that high localized stresses be produced in those portions of the gasket 13 which are contacted by said sealing surface.

It can readily be seen from the foregoing description that our invention provides a closure cap and container combination with an effective sealing action, yet whose seal is relatively easily broken as well as effected initially. In addition this combination practically eliminated the "cocked cap" etc. problems, above mentioned. For example, in the commercial sealing of 100,000 containers with these caps, it was found that only one was defective for these reasons. The combination of this invention was also subjected to heavy blows upon the closure cap in the area of the gasket by a $\frac{3}{8}$ inch steel rod. It was surprisingly found that not only was the hermetic seal not broken despite very heavy mutilation of the cap periphery but that the glass rim was able to withstand the heavy impacts. Such leakage resistance after heavy impact has not been found in closure caps of the prior art.

Various modifications may be resorted to within the spirit and scope of this invention as defined by the following claim.

We claim:

In combination, a container and closure cap for hermetically sealing the container, the closure cap comprising a disk-like panel, a depending attaching annular skirt at the periphery of said panel, and an annular rubber-like sealing gasket disposed internally of the cap and contiguous with said panel and skirt; said container having a cylindrical mouth-defining neck of less diameter than said disk-like panel and terminating at its free end in an annular rim, the outer corner of said neck defining an annular sealing gasket accommodating channel; said channel including an annular floor section spaced radially outwardly and axially downwardly from said rim and in a plane transverse to the axis of said container and an upwardly and inwardly inclined wall section, a concave surface joining said floor and wall section, and a convex surface uniting said floor section and said neck; an annular space between said cap skirt and said annular floor section, interengageable means on the cap and said neck

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for separably connecting them by rotation of one with respect to the other, whereby said cap is moved axially with respect to the container to a sealing position, the uncompressed gasket flowing into the space provided by said floor and wall and being compressed upon sealing engagement of said cap and container, the annular portion of said gasket over said floor being under greater compression than the annular portion of said gasket over said space, said annular gasket portion over said space surrounding said annular gasket portion over said floor, and the radial extent of said annular gasket portion over

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said space being substantially as great or greater than the radial extent of said annular gasket portion over said floor.

References Cited**UNITED STATES PATENTS**

1,842,429	1/1932	Scofield	-----	215—40
2,445,647	7/1948	Thomas	-----	215—40

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