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(71) Applicant and
(72) Inventor: ENGLUND, Gary [US/US]; 2 Conesus Ct.,
Hawthorn Woods, IL 60047 (US).

(74) Agents: SHAKULA, Peter, J. et al.; Barnes & Thornburg
LLP, P.O. Box 2786, Chicago, IL 60690-2786 (US).

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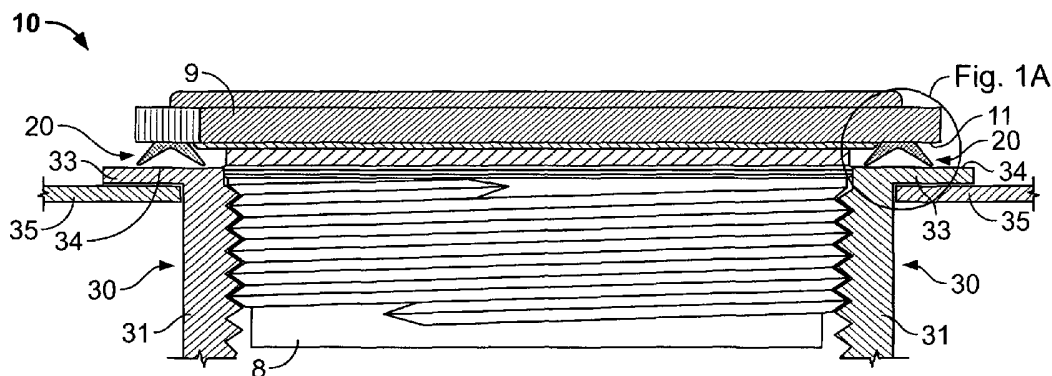
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(54) Title: SHAPED SEALING GASKET



(57) Abstract: The invention described herein is a shaped seal or gasket for use with a screw cap as commonly used in chemical barrels. The shaped gasket has a profile that includes a winged portion for contacting a sealing surface. The winged portion of the gasket defines a concave surface. The gasket has a second surface, or zone of contact, for contacting against a second surface, such as the underside of a screw cap. The winged portion of the gasket profile is wider than the zone of contact. The gasket profile can take on many different configurations, as shown in the drawings.

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SHAPED SEALING GASKET**INVENTOR:** Gary Englund**RELATED APPLICATIONS**

[0001] This application claims priority to United States Provisional Application 60/490, 607 filed on July 28, 2003.

FIELD OF THE INVENTION

[0002] The invention relates a shaped gasket generally used in association with a cap to seal vessels, drums, casks, barrels or containers for containing liquid, or other applications where an air or liquid tight seal are required. An example of such a container is a 55 gallon drum having an aperture in its lid, the aperture being adapted to receive the cap and gasket, the gasket forming an air or watertight seal.

SUMMARY OF THE INVENTION

[0003] The disclosure herein is for a gasket or seal generally used with a screwcap. A typical application is the screw plug found in 55 gallon drums used for containing liquids. However, one skilled in the art will recognize that the gasket profiles described and claimed herein have applications in other apparatus where an air or watertight seal is desired, and need not be limited to annular gaskets .

[0004] The threaded cap and gasket shown herein is generally used for 55 gallon storage drums, and is screwed into a threaded hole or aperture in the drum. The threaded aperture is often times formed by inserting a flanged receiver into the lid or side wall of the drum. The flanged portion remains outside of the drum, with a cylindrical portion bearing the threads extending into the interior of the drum. The flanged portion then forms a bearing or sealing surface for the gasket when the cap is screwed in to the threaded aperture.

[0005] One skilled in the art will recognize that other types of securing structure could be used to secure the cap instead of threads. For example, the cap could be secured by friction fit, bayonet mount, or other mechanisms known for securing a cap or plug into an aperture. In any instance, the shaped gasket is included to form a water or air tight seal between the cap and a bearing surface surrounding the aperture. The gaskets shape includes a portion that contacts the cap, and distended wing portions that form a profile wider than the portion of contact with the cap. The portion of the gasket between the distended portions is generally concave, so as to form two areas of initial contact with the opposing sealing surface. In some

embodiments, the sealing surface may be shaped to provide a convex surface opposing the concave surface of the gasket. The gasket may be made of any material commonly used for gaskets, such as rubber, nylon, silicone, urethane, neoprene, polypropylene, polyethylene, or any other pliable material used in the gasket industry. The gasket may be made of the same material as the cap, and be formed as a unitary structure with the cap. Additionally, the gasket may be attached to the cap by a co-molding process, where the gasket and cap may or may not be constructed of the same material.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0006]** Figure 1 is a cross sectional view of a threaded cap and shaped gasket.
- [0007]** Figure 2 is a cross-sectional view of the preferred embodiment of the gasket profile.
- [0008]** Figure 3 is a cross-sectional view of an alternate embodiment of the gasket profile.
- [0009]** Figure 4 is a cross-sectional view of an alternate embodiment of the gasket profile.
- [00010]** Figure 5 is a cross-sectional view of an alternate embodiment of the gasket profile.
- [00011]** Figure 6 is a cross-sectional view of an alternate embodiment of the gasket profile.
- [00012]** Figure 7 is a cross-sectional view of an alternate embodiment of the gasket profile.
- [00013]** Figure 8 is a cross-sectional view of an alternate embodiment of the gasket profile.
- [00014]** Figure 9 is a cross-sectional view of an alternate embodiment of the gasket profile.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

- [00015]** With reference to Figures 1 and 1A, a threaded cap 10 and gasket or seal 20 are shown in association with a threaded receiver 30 inserted into an aperture, such as would be used in the lid 35 of a 55 gallon drum or other container. The cap 10 includes a top portion 9 and a cylindrical portion 8 having threads. The receiver 30 includes a cylindrical portion 31 and a flange 33, the cylindrical portion 31 of the receiver adapted to receive the cylindrical portion 8 of the cap 10, allowing the cap 10

to be screwed into the receiver. In general, the underside 11 of the cap 10 is parallel to the flange 33, but such a relationship is not necessary. The flange 33 extends about the perimeter of the aperture a sufficient distance so as to form a sealing or bearing surface 34 for the gasket or seal 20, positioned on the underside 11 of the cap 10. In an alternate embodiment, the gasket or seal 20 bears upon the lid 35 of the drum. One skilled in the art will recognize the bearing surface 34 can be any structure below the underside 11 of the cap, such that the surface will form a water or airtight seal when the cap 10 is tightened into the receiver 30.

[00016] The gasket or seal 20, shown in profile in the drawings, is annular and extends around the cap 10. Although the gasket can touch both the cylindrical portion 8 and the top 9 of the cap 10, the gasket 20 can also be sized or positioned so that it does not contact the cylindrical portion 8 of the cap 10. In the preferred embodiment, the gasket or seal 20 has a zone of contact or attachment 21 that contacts the underside 11 of the cap 10. The zone of contact 21 may be attached to the cap 10 by a suitable adhesive, bonding, or other means of attachment such as co-molding, or it may be unadhered and simply be in contact with the cap 10 at the zone of contact 21. In an alternate embodiment, the gasket 20 and cap 10 are made as a unitary structure, the zone of contact 21 in such an embodiment being defined as the same area of the structure as if the gasket were adhered to the underside 11 of the cap 10.

[00017] In the preferred embodiment, the zone of contact or attachment 21 of the gasket 20 is generally flat, as shown in the figures, or corresponds to the shape or surface to which it is contacting. For instance, if the underside 11 of the cap 10 had grooves, it is contemplated that the gasket 20 will have corresponding grooves on the zone of contact or attachment 21. Such correspondence however, is not necessary.

[00018] As shown in Figures 1, 2, 3, 7, 8, and 9, the seal 20 has distending winged portions 22 and 23 that extend away from the zone of contact or attachment 21. Thus, it is preferred that the widest portion of the gasket, in this instance the distending winged portions 22 and 23, is wider than the zone of contact 21. The seal 20 forms a generally concave shape between the ends 40 and 41 of the winged portions 22 and 23. Within these general parameters, it is recognized that the seal 20 may take different shapes in cross-section or profile, as exemplified in Figures 2 through 9. Further, it is not required that each of the winged portions be of the same shape.

[00019] In operation, as the cap 10 is screwed into the receiver 30, the winged portions 22 and 23 of the seal 20 contact a surface to achieve closure or a water or air

tight seal. In the preferred embodiment, the seal is positioned around the cap 10 so that the winged portions 22 and 23 contact the receiver flange 33, barrel lid 35, or other bearing or sealing surface 34.

[00020] In alternate embodiments, as shown in Figures 4, 5 and 6, the winged portions 22 and 23 extend no wider than the zone of contact or attachment 21. As the cap 10 is screwed into the receiver 30, the seal or gasket 20 is compressed between the underside 11 of the cap 10 and the bearing surface 34. When compressed, the winged portions 22 and 23 of the seal or gasket 20 can extend beyond the width of the zone of contact or attachment 21.

[00021] As shown in the figures, the gasket or seal can take on a number of different shapes. One will recognize that the attribute and structures shown in any of the embodiments can be combined with those of the other embodiments to form profiles not shown, but consistent with the claimed invention. For instance, the profile shown in Figure 1 could include the concave walls 48 and 49 as shown in Figure 6.

[00022] As shown in Figure 2, the seal 20 includes distending winged portions 22 and 23 that form an angle of approximately 45 degrees with respect to the underside 11 of the cap 10. The ends 40 and 41 of the winged portions 22 and 23 are generally rounded. Between the ends 40 and 41, the concave portion 25 is generally rounded as well, although the surface of the seal between the ends need not assume any particular shape, so long as it is concave.

[00023] As shown in Figure 3, the seal 20 can include a concave portion 25 that has generally straight walls 44 and 45 that converge at an vertex 26. Also shown in Figure 3, the distending winged portions can exhibit an angle greater than 45 degrees with respect to the underside 11 of the cap 10. Such an angular arrangement allows for a larger zone of contact or Attachment 21 and increases the seal 20's resistance to compressive forces, as the cap 10 is screwed into the receiver 30.

[00024] In the alternate embodiment shown in Figure 4, the winged portions form an angle of 90 degrees with the underside 11 of cap 10. In such an arrangement, the walls 44 and 45 are essentially perpendicular to both the underside 11 of the cap 10, and the bearing or sealing surface 34, when the gasket or seal 20 is in an uncompressed state. The alternate embodiment also demonstrates the ends 40 and 41 of the winged portions 22 and 23 can be generally pointed, rather than rounded. The concave portion 25 is formed by straight surfaces 46 and 47 meeting at an vertex 26. The distance from the vertex 26 to the underside 11 of the cap 10 is approximately

one half of the distance from the ends 40 and 41 of the winged portions 22 and 23 to the underside 11 of the cap 10. Put another way, the concave portion 25 has a maximum depth that is roughly one half of the total height of the seal 20. The depth of the concave portion can vary from one eighth of the total height of the seal 20 to seven eighths of the maximum height of the seal 20. In the case of a co-molded cap and gasket, the maximum depth is not applicable, as the division between the cap and gasket is non-existent. In such an embodiment, the maximum depth of the cap can occur at a level above the underside of the cap.

[00025] As shown in Figure 5, an alternate embodiment includes winged portions 22 and 23 that do not extend beyond the width of the zone of attachment or contact 21 when the seal 20 is in an uncompressed state. When such a seal 20 is compressed between the underside 11 of the cap 10 and the bearing or sealing surface 34, the ends 40 and 41 of the winged portions 22 and 23 can extend beyond the width of the zone of attachment 21.

[00026] As shown in Figure 6, the walls 48 and 49 extending from the zone of contact 21 to the ends 40 and 41 of the winged portions 22 and 23 can be concave.

[00027] As shown in Figure 7, 8, and 9, the seal 20 can be attached to the barrel or flange 33 instead of the cap 10. In such an arrangement, the underside 11 of the cap 10 becomes the bearing or sealing surface 34, and the flange 33 bears upon the zone of contact 21. As shown in Figures 8 and 9, the sealing surface 34 may include a shape 50 protruding therefrom. Put another way, the bearing or sealing surface 34 need not be flat, but may be convex. The sealing surface 34 can also include contours or any shape or profile, including rounded and angular portions. The shape is received by the concave portion 25 of the seal 20, thereby providing a greater surface area of contact for the seal 20. The shape 50 need not be of complimentary shape to the concave portion 25. As shown in Figure 8, the shape 50 can be generally rounded, and the concave portion 25 of the seal 20 can be angular, having straight surfaces 46 and 47. However, in other embodiments, the shape 50 can be complimentary, as shown in Figure 9. Such a complimentary arrangement maximizes the contact surface area with the concave portion 25 of the seal 20.

[00028] The description and drawings of the preferred embodiment are merely illustrated in nature, and the present application includes all other embodiments and equivalents that are within the spirit and scope of the described embodiment.

CLAIMS

I claim:

- [C1]** A gasket for use with a cap for creating a seal with a sealing surface opposing the cap, said gasket having a zone of contact for contacting the underside of the cap, the gasket profile including winged portions extending away from the zone of contact, said winged portions forming a width greater than the width of the zone of contact, the winged portions forming a concave surface for creating a seal against the sealing surface.
- [C2]** The gasket of claim 1, the winged portions terminating in ends and forming the concave surface there between, the concave surface having two flat surfaces meeting at an vertex.
- [C3]** The gasket of claim 2, where at least one of the ends is rounded.
- [C4]** The gasket of claim 2, where at least one of the ends is pointed.
- [C5]** The gasket of claim 2, the gasket having a concave surface extending from the zone of contact to an end of a winged portion.
- [C6]** The gasket of claim 1, wherein the winged portions form a width greater than the width of the zone of contact only when compressed between the cap and the sealing surface.
- [C7]** A gasket having a first surface for contacting the surface of another object and a concave surface for contacting a sealing surface opposing the second surface, the concave surface being wider than the first surface.
- [C8]** The gasket of claim 7, wherein the first surface is flat.
- [C9]** The gasket of claim 7, wherein the first surface is shaped to complement the second surface.
- [C10]** The gasket of claim 7, wherein the gasket includes a second concave surface, the second surface being between the first surface and the first concave surface.
- [C11]** The gasket of claim 7, wherein the concave surface is formed by two straight surfaces meeting at a junction.
- [C12]** The gasket of claim 7 wherein the sealing surface includes a protrusion to be received by the concave surface of the gasket when the first surface and sealing surface act to compress the gasket there between.
- [C13]** The gasket of claim 12, wherein the protrusion is shaped to complement the shape of the first concave surface.
- [C14]** The gasket of claim 7, wherein the gasket is annular.

- [C15]** A gasket for creating a seal between two surfaces, the gasket having a shaped profile including:
a zone of contact for contacting a first surface,
a concave surface for contacting a second surface, said concave surface being of greater width than the zone of contact.
- [C16]** The gasket of claim 15, wherein the gasket is annular.
- [C17]** The gasket of claim 15, wherein the concave surface has a depth of between $1/8^{\text{th}}$ and $7/8^{\text{th}}$ s of the total height of the gasket profile.
- [C18]** The gasket of claim 15, wherein the gasket is made of a material from the following group: rubber, nylon, silicone, urethane, or neoprene, polypropylene, or polyethylene.
- [C19]** The gasket of claim 15, the concave surface having a width greater than the zone of contact only when the gasket is compressed between the two surfaces.
- [C20]** The gasket of claim 15, further including at least one additional concave surface located between the first concave surface and the zone of contact.
- [C21]** The gasket of claim 1, wherein the sealing surface includes a shape to be received by the concave surface of the gasket.

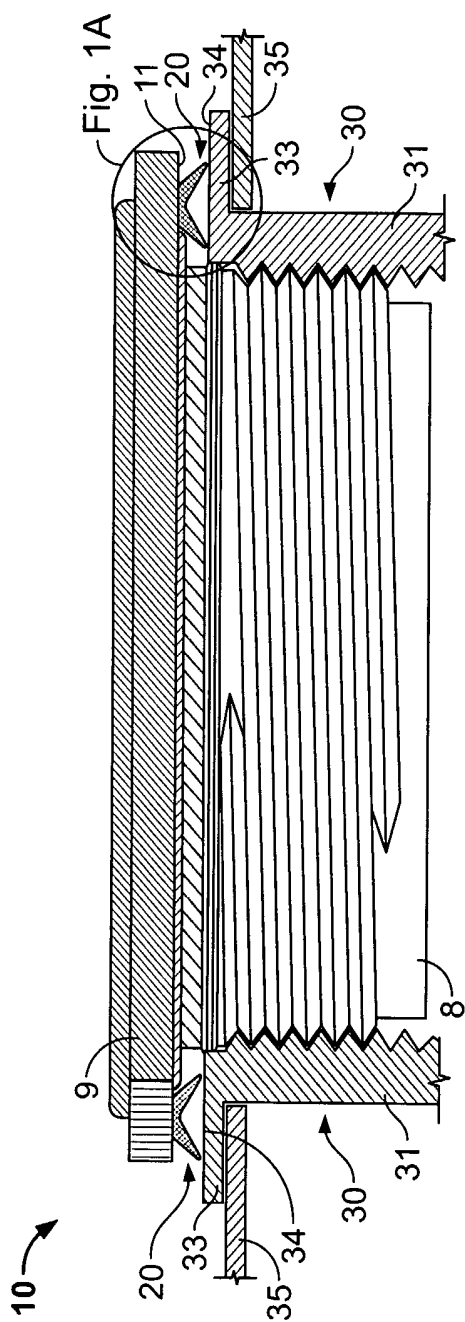


FIG. 1

1/2

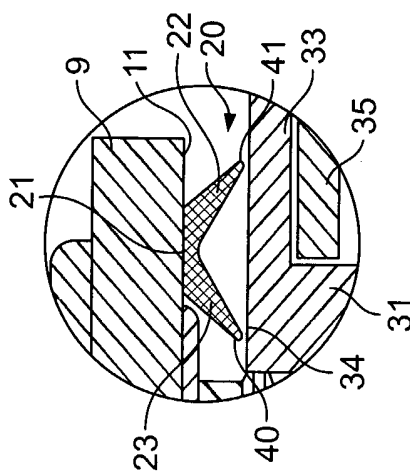


FIG. 1A

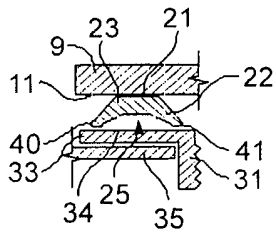


FIG. 2

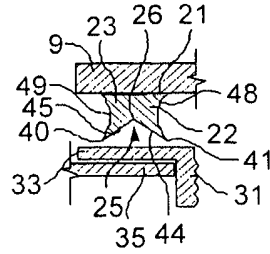


FIG. 6

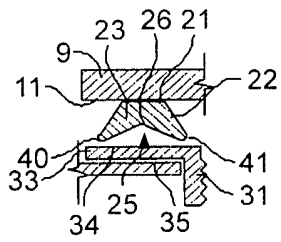


FIG. 3

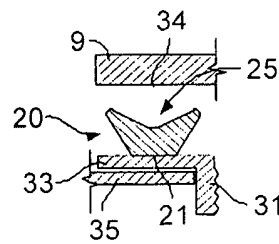


FIG. 7

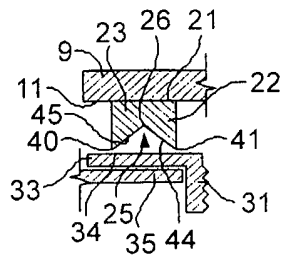


FIG. 4

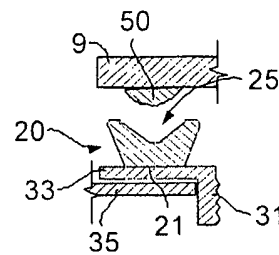


FIG. 8

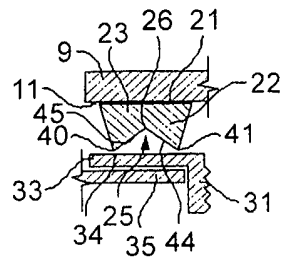


FIG. 5

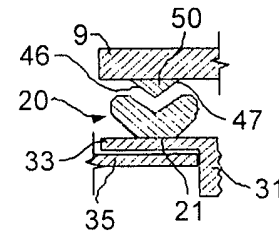


FIG. 9