PORTAL SEAL AND WIPER FOR PRODUCT CONTAINER

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ABSTRACT
Embosed strips are disposed on a sealing and wiping diaphragm to attain an irregular wiping action about the periphery of an applicator in a product container. A sealing and wiping portion is disposed on the diaphragm and is configured to present predetermined flexure characteristics in each direction along the operational axis of the product container. Furthermore, a chamber is disposed in the diaphragm to provide insertion lead and withdrawal expansion for the applicator. The diaphragm can be incorporated integrally on a sealing gland of a reservoir assembly which functions cooperatively with the applicator to create the product container. Within the reservoir assembly the sealing gland is interlocked on a portal bushing to simplify the construction, while achieving a peripheral seal of predetermined parameters about the portal bushing.

12 Claims, 7 Drawing Figures
PORTAL SEAL AND WIPER FOR PRODUCT CONTAINER

BACKGROUND OF THE INVENTION

The present invention relates to a flexible diaphragm for use in a reservoir assembly to seal about and wipe against an applicator, especially such a diaphragm for providing an irregular wiping action about a periphery and having a sealing and wiper portion which is dimensionally adaptable to a variety of sealing and wiping applications. Diaphragms can be utilized within reservoir assemblies containing products for a wide variety of purposes such as cosmetics, paint, glue, or medicine and these products can be in many different forms such as liquid, gel, or compressed powder. For most products, the applicator is detachably joined to the reservoir assembly in creating a product container. The product is stored in the reservoir assembly and the applicator includes a tip which extends on a shaft to contact the product within the reservoir assembly. As the applicator is withdrawn from the reservoir assembly, the diaphragm must provide a wiping action against the shaft and tip, whereas the diaphragm must provide a portal seal about the shaft to preclude leakage of the product therearound, when the product container is closed. The wiping action removes excess product from the shaft while providing a means for controlling the amount of product carried by the tip.

In many product applications, the wiping action must apply an irregular pressure about the applicator so as to leave longitudinal strips of product on the tip thereof. Such product control is presently accomplished by disposing a notch on the wiping surface of the diaphragm for each strip of product desired. However, the wiping surface and the sealing surface are essentially the same and the notches have a deleterious effect on the portal seal. Furthermore, for most product applications the diaphragm must exert forces of different magnitudes against the applicator in achieving the portal seal and the wiping action. Therefore, most known diaphragms utilize very complex cross-sectional configurations to provide particular flexure characteristics in each operational direction of the product container.

Since the products stored in such containers have very different physical characteristics, the structural cooperation existing between the reservoir assembly and the applicator will vary for each product. Of course, the storage capacity of the reservoir assembly is the determinative factor as to the size of all parts therein. However, applicators exist with tips of widely varying natures in that some tips have bristles in either longitudinal or radial arrangement, while other tips have only spiral grooves and still other tips are made of either felt or cellular foams in both the open and closed cell varieties. For each tip type a different wiping action is required and therefore, diaphragms having unique cross-sectional configurations have developed for each product application. Since little similarity in cross-sectional configuration exists between the diaphragms now in use, diaphragms for new product applications are usually developed by empirical analysis which is very time consuming and expensive. Furthermore, some types of applicator tips require that the diaphragm have a chamber to provide a lead therefor in the direction of applicator insertion and for expansion thereof in the direction of applicator withdrawal and many diaphragm configurations have no such chamber.

A portal bushing provides an access into a reservoir body in the conventional reservoir assembly and in addition to the portal seal discussed above, a peripheral seal must be accomplished therebetween. As mentioned in my copending application Ser. No. 348,103 filed on Apr. 5, 1973, sealing glands which provide both the portal seal and the peripheral seal are known. Such sealing glands include a tubular frame which is compressed between the portal bushing and the reservoir body to achieve the peripheral seal and a diaphragm having particular flexure characteristics extends across one end of the tubular frame to achieve the portal seal. For the same reasons discussed above, diaphragm configurations within sealing glands tend to be unique for each product application and therefore, costly empirical analysis is required for any new product applications. The notches usually incorporated to apply a peripherally irregular wiping action and the chamber for tip lead and expansion are also matters of concern on diaphragms disposed within sealing glands. Furthermore, such sealing glands are made of highly compressible material and are only retained to the bushing with a stretch fit thereover. Therefore, the interfacing surface at the peripheral seal is not controllable as the component parts vary within allowable tolerance. In addition to this, it is desirable to have the sealing gland joined reliably to the portal bushing as a subassembly for inventory purposes, however, the stretch fit provides no interlock by which the integrity of the subassembly would be assured.

SUMMARY OF THE INVENTION

It is, therefore, a general object of the present invention to provide for a portal seal and wiping action in a reservoir assembly with a flexible diaphragm which minimizes and obviates the disadvantages of the prior art.

It is a specific object of the present invention to provide a portal seal and wiping action in a reservoir assembly with a flexible diaphragm which applies irregular pressure peripherally about an applicator without the use of notches.

It is a more specific object of the present invention to provide a portal seal and wiping action in a reservoir assembly with a flexible diaphragm which includes an inner diametral portion for exerting predetermined sealing and wiping forces against an applicator.

It is another object of the present invention to provide a portal seal and wiping action in a reservoir assembly with a flexible diaphragm which includes a chamber to provide insertion lead and withdrawal expansion for an applicator.

It is still another object of the present invention to incorporate a diaphragm for applying a peripherally irregular wiping action into a sealing gland which assures creation of a peripheral seal over a minimal surface between a portal bushing and a reservoir body.

It is a further object of the present invention to incorporate a diaphragm for applying a peripherally irregular wiping action into a sealing gland which interlocks to a portal bushing for assuring subassembled integrity therewith.

It is still a further object of the present invention to incorporate a diaphragm for applying a peripherally irregular wiping action into a sealing gland which creates a peripheral seal between a portal bushing and a reser-
voir body within predetermined sealing parameters having relatively precise limits.

These objects are accomplished in one form by configuring the diaphragm annularly and with distinct co-
axial portions. The interior portion is disposed within the exterior portion and on one end thereof along the annular axis. To achieve particular flexure characteristics in each direction along the annular axis, the inte-
rior portion is generally rectangular in cross-section but has one tapered side. On the other end of the exterior portion the inside diameter thereof creates a chamber with a cylindrical periphery. Embossments extend rad-
ially from the annular axis across both portions to estab-
lish arcuate segments of relatively increased flexibility peripherally about the annular axis. Furthermore, where a sealing gland is utilized to provide both periph-
eral and portal seals within a reservoir assembly, the di-
aphragm of this invention can be incorporated inte-
grally thereon to achieve the portal seal.

BRIEF DESCRIPTION OF THE DRAWING

The manner in which these and other objects of the invention are achieved will be best understood by refer-
ence to the following description, the appended claims, and the figures of the attached drawing wherein:

FIG. 1 is an elevational view of a product container with portions thereof cut away to disclose the internal components which include the diaphragm of this invention;

FIG. 2 is an enlarged partial elevational view thereof with the applicator being withdrawn from the reservoir assembly and illustrating the wiping action of the dia-
aphragm against the applicator;

FIG. 3 is a view similar to FIG. 2 but illustrating the undistorted configuration of the diaphragm;

FIG. 4 is a perspective view of the diaphragm and il-
lustrates the radially disposed embossments thereon;

FIG. 5 is an elevational view of a product container with portions thereof cut away to disclose the internal components which include a sealing gland having the diaphragm of this invention integrally incorporated thereon;

FIG. 6 is an enlarged sectional view of the sealing gland from the product container of FIG. 5 with por-
tions thereof cut away to illustrate an annular lip and the diaphragm of this invention; and

FIG. 7 is a view similar to FIG. 6 but for another sealing gland with the diaphragm of this invention inte-
grally incorporated thereon and illustrating a right cylindrical portion which is disposed to provide predetermined sealing parameters at a peripheral seal.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawing and more particularly to FIG. 1, there is illustrated a product container 10 in
which a reservoir assembly 12 and an applicator 14 are detachably joined. The applicator 14 is constructed of a cylindrical shell 16 within which is mounted a cup-
shaped insert 18 providing female threads 20 and se-
curing one end of a shaft 22. At the other end of the shaft 22, radially aligned bristles form a tip 24 to which product adheres when the applicator 14 is joined to the reservoir assembly 12. Although tip 24 is the only type illustrated throughout this disclosure, the diaphragm of this invention can be adapted to product containers which utilize applicators with other types of tips. Therefore, product applications requiring either felt or cellular foam tips, as well as those requiring tips with spiral grooves or longitudinally aligned bristles, are within the scope of this invention.

Construction of the reservoir assembly 12 is illus-
trated in FIG. 2 where a reservoir body 26, sized in ac-
cordance with the amount of product stored, is spe-
cially configured to receive and fixedly retain a portal bushing 28. Male threads 30 are disposed on the bush-
ing 28 for mating with the female threads 20 on the app-
icator 14 when joining the reservoir assembly 12 thereto. The bushing 28 has an open ended chamber 32 therein to serve as a portal through which the applica-
tor 14 gains access into the reservoir assembly 12. One end of the bushing 28 is specially configured with a counterbore 34 to locate a diaphragm 36 and a sealing cup 38 is affixed to the bushing 28 by an interference fit to retain the diaphragm 36 in the counterbore 34. An aperture 40 is disposed in the sealing cup 38 to sym-
metrically align about the portal axis of the bushing 28. To prevent leakage of product from the reservoir as-
sembly 12, a peripheral seal 42 must be provided around the bushing 28 and a portal seal 44 must be pro-
vided therein. The portal seal 44 is developed by the diaphragm 36 which forcibly bears against the shaft 22 and the peripheral seal 42 is developed by the sealing cup 38 which is compressed between the reservoir body 26 and the bushing 28.

As illustrated in FIG. 3, the diaphragm 36 is annu-
larly configured and includes an inner diametral por-
tion 46 and an outer diametral portion 48. The inner diametral portion 46 is disposed at one axial end of the diaphragm 36 within the outer diametral portion 48 and a face 50 extends across both diametral portions 46 and 48 perpendicularly to the annular axis. Embossed strips 52 extend radially across the face 50 to define ar-
cuate segments 54 thereon, as illustrated in FIG. 4. At the other axial end of the diaphragm 36, an open end chamber 56 is disposed which has a cylindrical periph-
ery equal to an inside diameter in the outer diametral portion 48. Both diametral portions 46 and 48 are gen-
erally of rectangular cross-sectional configuration, how-
ever, the inner diametral portion 46 includes a lin-
early tapered side 58 which results in a varying thick-
ness along the annular axis. The diaphragm 36 may be fabricated of any suitable elastic material, such as an elastomeric and/or with any suitable process, such as molding. Within the reservoir assembly 12 the dia-
aphragm 36 is disposed with the open end of the cham-
ber 56 facing in the direction of applicator withdrawal.

When the product container 10 is not in use the app-
icator 14 is joined to the reservoir assembly 12 and
the portal seal 44 is provided therebetween by the inner diametral portion 46 of the diaphragm 36 which dis-
torts in one direction to exert radial forces against the shaft 22, as illustrated in FIG. 1. When product is ap-
plied from the product container 10, the applicator 14 is withdrawn from the reservoir assembly 12 and the inner diametral portion 46 of the diaphragm 36 distorts in the other direction to exert radial forces in wiping the shaft 22 and tip 24, as illustrated in FIG. 2. Because the radial forces of the portal seal 44 differ in magni-
tude from those of the wiping action in most product applications, the inner diametral portion 46 is cross-
sectionally configured to provide different flexure characteristics in each direction along the annular axis.
This difference in flexure characteristics is accomplished with the tapered side 58 which lowers the spring constant encountered in the direction of applicator insertion relative to that encountered in the direction of applicator withdrawal. Of course the relative difference between the spring constants encountered in each direction is directly related to the angle at which the tapered side 58 is disposed. Therefore, the same generally rectangular cross-sectional configuration can be utilized for the inner diametral portion 46 when other spring constants are desired. Furthermore, the flexure characteristics of this generally rectangular cross-sectional configuration can be predetermined for new product applications and therefore, economies are realized by eliminating the empirical analysis normally required.

Of course, every dimensional parameter of the inner diametral portion 46 has some affect on the flexure characteristics and therefore, dimensional parameters other than the angle at which the tapered side 58 is disposed, can be changed to adapt the diaphragm 36 to new product applications. Furthermore, parameters other than dimensions can be changed to adapt the diaphragm 36 to new product applications, such as the durometer of the material utilized in the diaphragm 36. Also, radial slits can be disposed in the inner diametral portion 46 for determining the flexure characteristics, although not illustrated in the drawing. Of course, the flexure characteristics of the inner diametral portion 46 will depend on the radial length of the slits and therefore, the diaphragm 36 can be fabricated without the slits and thereafter adapted to particular product applications by adding the slits. Furthermore, radial slots having an open space thereacross could be utilized where greater diaphragm flexibility is desired than can be accomplished with the radial slits.

The embossed strips 52 provide radial stiffness to the diaphragm 36, however, the arcuate segments 54 maintain an increased flexibility relative thereto, along the annular axis. Therefore, the diaphragm 36 exerts a peripherally irregular wiping action against the applicator 14. A product control is thereby attained to leave longitudinal strips of product on the tip 24 without utilizing notches in the diaphragm 36.

Although the inner diametral portion 46 is located at one axial end of the diaphragm 36, it could be located at any location along the annular axis within the outer diametral portion 48. Also, the severity of irregularity in the wiping action can be predetermined from the length and location of the embossed strips 52. Of course, the embossed strips 52 can be separated by any angle on the face 50 of the diaphragm 36 and can extend across either or both diametral portions 46 and 48. Furthermore, the stiffness provided by the embossed strips could be accomplished with radial gussets disposed within the diaphragm 36 between the diametral portions 46 and 48. Of course, the embossed strips 50 or radial gussets could be utilized to attain the irregular wiping action of this invention on diaphragms having other cross-sectional configurations than that illustrated in FIGS. 1-3.

Chamber 56 in the diaphragm 36 provides for tip lead on insertion of the applicator 14 thereinto and for tip expansion on withdrawal of the applicator 14 therefrom. Although this lead and expansion are not required for every type of tip, use of the chamber 56 is especially desirable with tips having radially aligned bristles similar to tip 24 illustrated in FIGS. 1-7. Of course, the depth of the chamber 56 diminishes when the inner diametral portion 46 is located within the outer diametral portion 48 at an intermediate location along the annular axis. However, chambers of very minor depth have been found to be most significant to the wiping action in some product applications.

As illustrated in FIG. 5, a sealing gland 60 can be configured and disposed within a reservoir assembly 62 to provide both a peripheral seal 64 and a portal seal. In this arrangement, the sealing gland 60 is affixed on the end of a portal bushing 66 which is fixedly retained within a reservoir body 68 by any suitable means, such as an interference fit. One end of the bushing 66 is specially configured to interlock with the sealing gland 60 in that a tapered lead 70, an annular shoulder 72, and an annular groove 74 are provided. Otherwise, the bushing 62 is configured identically to the bushing 28 shown in FIGS. 1-3 in that an open ended chamber 76 exists therethrough and male threads 78 are disposed thereon. In FIG. 5, the applicator 14 is identical to that shown in FIGS. 1-3 and therefore, the parts thereof are identified with the same reference numerals as used in FIGS. 1-3.

The structural makeup of the sealing gland 60 is illustrated in FIG. 6 where an annular lip 80 and a diaphragm 82 configured in accordance with this invention are integrally disposed on a tubular frame 84. The diaphragm 82 is disposed across the longitudinal axis of the tubular frame 84 at one axial end thereof, whereas the annular lip 80 is disposed on the interior wall of the tubular frame 84 at the other axial end thereof. The tubular frame 84 is conically shaped, being of minimum diameter at the diaphragm end and of maximum diameter at the annular lip end. The diaphragm 82 is identical to the diaphragm 36 shown in FIGS. 1-4 and therefore, has an inner diametral portion 86 and an outer diametral portion 88. The inner diametral portion 86 is disposed at one axial end of the diaphragm 82 within the outer diametral portion 88 and a face 90 extends across both diametral portions 86 and 88 perpendicularly to the annular axis. Embossed strips 92 extend radially across the face 90 to define arcuate segments 94 thereon. At the other axial end of the diaphragm 82 an open end chamber 96 is disposed which has a cylindrical periphery equal to an inside diameter in the outer diametral portion 88. Both diametral portions 86 and 88 are generally rectangular in cross-sectional configuration, however, the inner diametral portion 86 includes a linearly tapered side 98 which results in a varying thickness along the annular axis. In cross section, the annular lip 80 is trapezoidal with converging sides extending inwardly toward the axis of the tubular frame 84 and a flat face 102 extending across the converging sides 100. Any suitable elastic material may be utilized to fabricate the sealing gland 60, such as an elastomeric and any suitable process may be utilized for its fabrication, such as molding.

When utilized within the reservoir assembly 62, the sealing gland 60 is interlocked to the bushing 66 with the annular lip 80 engaging into the annular groove 74 and thereby, a subassembly of highly reliable integrity is created. Of course, the annular lip 80 must be expanded to pass over the annular shoulder 72 on the bushing 66, however, due to the elastic nature of the sealing gland 60 and the tapered lead 70 on the bushing 66, this presents no great difficulty. The subassembly of
the sealing gland 60 and bushing 66 is then joined with the reservoir body 68 by locating the sealing gland 60 into the open end thereof and forcibly inserting the bushing 66 thereinto. During insertion, the conical taper and elastic nature of the tubular frame 84 are effective to centrally locate the sealing gland 60 within the reservoir body 68 and thereby establish a symmetrically distributed interface thereagainst.

Functionally, within the reservoir assembly 62 the peripheral seal 64 is created by the sealing gland 60 at the symmetrically distributed interface, as illustrated in FIG. 5. This is so because radially directed sealing forces are developed within the sealing gland 60 between the bushing 66 and the reservoir body 68 due to the tubular frame 84 and the annular lip 80 being compressed therebetween. The peripheral seal 64 covers a minimal surface of cylindrical area which is equal to the inner periphery of the reservoir body 68 at the symmetrically distributed interface multiplied by the width of the flat face 102. Because the magnitude of compression is proportional to the combined radial thickness of the tubular frame 84 and the annular lip 80, the force exerted by the peripheral seal 64 can be predetermined within relatively precise limits by merely varying this combined thickness. The proportionality factor relating the sealing forces to the amount of compression can be either linear or nonlinear depending on the cross-sectional configuration of the annular lip 80. Since the annular lip 80 is trapezoidal in cross-sectional configuration, the proportionality factor will increase with increasing compression and therefore, is nonlinear.

The inner diametral portion 86 of diaphragm 82 develops the portal seal when distorted in the direction of applicator insertion by exerting radial forces against the shaft 22 in the same manner as previously discussed for diaphragm 36 and shown in FIG. 1. As also discussed previously for diaphragm 36 and shown in FIG. 2, the inner diametral portion 86 of diaphragm 82 will impose a wiping action over the lip 24 when distorted in the direction of applicator withdrawal. Of course, the nature of the portal seal and the wiping action will again depend on the flexure characteristics of the inner diametral portion 86. Therefore, the dimensional parameters of the inner diametral portion 86 may be varied or radial slits may be disposed therein to predetermine the nature of the portal seal and the wiping action, while the force differential existing therebetween may be predetermined by the angle at which the tapered side 98 is disposed. Furthermore, the embossed strips 92 and arcuate segments 94 cooperate to exert a peripheral irregular wiping action against the applicator 14 and the chamber 96 provides for the tip lead and tip expansion, in the same manner as discussed previously for diaphragm 36.

When a peripheral seal having predetermined sealing parameters is desired, a sealing gland 104 may be configured as illustrated in FIG. 7, where because of the similarities which exist with the sealing gland 60, similar parts are identified by the same reference numerals used in FIG. 6, but with a prime (') added. In this configuration, a diaphragm 82' and an annular lip 80' are again disposed at opposite ends of a tubular frame 84' which is conically tapered therebetween. The annular lip 80' is disposed on a right cylindrical portion 106 and a raised rim 108' is peripherally disposed about the diaphragm end thereof. As before, the taper of the tubular frame 84' increases in diameter from the diaphragm end to the annular lip end. The annular lip 80' has parallel sides 110 projecting radially inward from the tubular frame 84' toward the longitudinal axis thereof and presents an arcuate face 112 which extends from one parallel side 110 to the other.

When utilized, the sealing gland 104 is disposed within a reservoir assembly with the identical reservoir body 68 and identical portal bushing 66 as that shown in FIG. 5. Therefore, the sealing gland 104 interlocks to the bushing 66 and seats within the reservoir body 68 in the same manner as discussed previously for the sealing gland 60. Again the conical taper and the elastic nature of the tubular frame 84' are effective to centrally locate the sealing gland 104 within the reservoir body 68 so as to establish a symmetrically distributed interface thereagainst. A peripheral seal is created as a result of radially directed forces developed within the sealing gland 104 between the bushing 66 and the reservoir body 68 due to the tubular frame 84' and the annular lip 80' being compressed therebetween. Again the sealing forces are exerted over the symmetrically distributed interface and are proportional to the magnitude of this compression. Due to the arcuate face 112 the proportionality factor is initially nonlinear but becomes linear after the arcuate face 112 is fully compressed. Also, the sealing forces of the peripheral seal can be predetermined within relatively precise limits by merely varying the combined radial thickness of the tubular frame 84' and the annular lip 80'. Furthermore, the annular lip 80' being disposed on the right cylindrical portion 106 of the tubular frame 84', the sealing forces are distributed over the outer surface of the right cylindrical portion 106. Since the right cylindrical portion 106 can have any desired width, the area of the symmetrically distributed interface at the peripheral seal can also be predetermined within relatively precise limits.

A portal seal and wiping action are developed when the inner diametral portion 86' of the diaphragm 82' is distorted, in the same manner as that discussed previously for the diaphragm 82 of sealing gland 60. Of course, the nature of the portal seal and the wiping action will again depend on the flexure characteristics of the inner diametral portion 86' and can be predetermined by either varying the dimensional parameters thereof and/or disposing radial slits therein. Also, the force differential existing between the portal seal and the wiping action may be predetermined by the angle at which the tapered side 98' is disposed. Furthermore, the embossed strips 92' and arcuate segments 94' cooperate to exert a peripheral irregular wiping action against the applicator 14 and the chamber 96 provides for the tip lead and tip expansion, in the same manner as discussed previously for diaphragm 82. Of course, the length of the tubular frame 84' separating the annular lip 80' from the diaphragm 82' can be varied in accordance with the particular product application. The raised rim 108' on the tubular frame 84' can be sized to provide for initial alignment within the reservoir body 68 on lengthy glands or to provide a supplemental peripheral seal.

It should be readily appreciated by those skilled in this art that embossed strips are disposed on the diaphragm of this invention to define the arcuate segments by which an irregular wiping action against an applicator is provided. This diaphragm can also include an
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inner diametral portion of a generally rectangular cross-sectional configuration by which both sealing and wiping actions against an applicator can be predetermined. Furthermore, a chamber can be disposed in this diaphragm to provide for tip lead and tip expansion. Also, the diaphragm of this invention can be incorporated into a sealing gland which interlocks with a portal bushing to establish a subassembly of high integrity. Otherwise, this sealing gland is configured to establish a peripheral seal of predeterminable parameters about the portal bushing.

It should be understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination or arrangement of parts may be resorted to without departing from the true spirit and the scope of this invention. Therefore, the present disclosure should be construed as illustrative rather than limiting.

What I claim is:

1. A flexible diaphragm for use in a reservoir assembly to establish a portal seal around and a wiping action over an applicator which passes therethrough when the reservoir assembly is utilized as part of a product container, said diaphragm comprising:

an annular ring having a face extending perpendicularly to the annular axis at one axial end thereof, said face having embossed strips extending radially thereacross, said strips being separated by arcuate segments of relatively increased flexibility, said arcuate segments cooperating with said embossed strips to provide an irregular wiping action peripherally about the annular axis.

2. The diaphragm of claim 1 wherein said annular ring includes an inner diametral portion and an outer diametral portion, said inner diametral portion being disposed along the annular axis within said outer diametral portion and being of varying thickness along the annular axis, said varying thickness resulting from a linearly tapered side, said inner diametral portion presenting particular flexure characteristics in each direction along the annular axis to provide the portal seal when flexed in one direction and the wiping action when flexed in the other direction, said outer diametral portion having an inside diameter at one axial end of said diaphragm, said inside diameter being the periphery of a chamber, said chamber providing for tip lead on applicator insertion and for tip expansion on applicator withdrawal.

3. A sealing gland for use in a reservoir assembly to establish a peripheral seal therein around a portal bushing and a portal seal about an applicator which passes therethrough when the reservoir assembly is utilized as part of a product container, said sealing gland being fabricated of elastomeric material and comprising:

a tubular frame;
an annular lip disposed on the interior wall of said tubular frame and to one longitudinal end thereof, said annular lip being interlockable to the bushing and radially compressible within the reservoir assembly to develop sealing forces against said tubular frame in establishing the peripheral seal; and
a scaling and wiping diaphragm disposed across the other end of said tubular frame, said diaphragm being an annular ring, said annular ring having a face extending perpendicularly to the annular axis at one axial end thereof, said face having embossed strips extending radially thereacross, said strips being separated by arcuate segments of relatively increased flexibility, said arcuate segments cooperating with said embossed strips to provide an irregular wiping action peripherally about the annular axis.

4. The sealing gland of claim 3 wherein the exterior of said tubular frame is conically tapered, said tubular frame being of minimum diameter at the diaphragm end and of maximum diameter at the annular lip end, said taper being effective to centrally locate said sealing gland within the reservoir assembly and to establish a symmetrically distributed interface therein; and wherein said annular lip is configured to have a trapezoidal cross section, the nonparallel sides of said annular lip being disposed to converge toward the longitudinal axis of said tubular frame.

5. The sealing gland of claim 3 wherein the exterior of said tubular frame is conically tapered, said tubular frame being of minimum diameter at the diaphragm end and of maximum diameter at the annular lip end, said taper being effective to centrally locate said sealing gland within the reservoir assembly and to establish a symmetrically distributed interface therein; and wherein said annular lip presents an arcuate face, said arcuate face extending across parallel sides, said parallel sides projecting inwardly from said tubular frame toward the longitudinal axis thereof.

6. The sealing gland of claim 3 wherein the exterior of said tubular frame is conically tapered between said annular lip and said diaphragm, said annular lip being disposed on a right cylindrical portion of said tubular frame, said right cylindrical portion being effective to establish predetermined sealing parameters for the peripheral seal; wherein said annular lip is configured to have a trapezoidal cross section, the nonparallel sides of said annular lip being disposed to converge toward the longitudinal axis of said tubular frame; and wherein a raised rim is peripherally disposed about the diaphragm end on said tubular frame.

7. The sealing gland of claim 3 wherein the exterior of said tubular frame is conically tapered between said annular lip and said diaphragm, said annular lip being disposed on a right cylindrical portion of said tubular frame, said right cylindrical portion being effective to establish predetermined sealing parameters for the peripheral seal; wherein said annular lip presents an arcuate face, said arcuate face extending across parallel sides, said parallel sides projecting inwardly from said tubular frame toward the longitudinal axis thereof; and wherein a raised rim is peripherally disposed about the diaphragm end on said tubular frame.

8. The sealing gland of claim 3 wherein said annular ring includes an inner diametral portion and an outer diametral portion, said inner diametral portion being disposed along the annular axis within said outer diametral portion and being of varying thickness along the annular axis, said varying thickness resulting from a linearly tapered side, said inner diametral portion presenting particular flexure characteristics in each direction along the annular axis to provide the portal seal when flexed in one direction and the wiping action when flexed in the other direction, said outer diametral portion having an inside diameter at one axial end of said diaphragm, said inside diameter being the periphery of a chamber, said chamber providing for tip lead on applicator insertion and for tip expansion on applicator withdrawal.
9. The sealing gland of claim 8 wherein the exterior of said tubular frame is conically tapered, said tubular frame being of minimum diameter at the diaphragm end and of maximum diameter at the annular lip end, said taper being effective to centrally locate said sealing gland within the reservoir assembly and to establish a symmetrically distributed interface therein; and wherein said annular lip is configured to have a trapezoidal cross section, the nonparallel sides of said annular lip being disposed to converge toward the longitudinal axis of said tubular frame.

10. The sealing gland of claim 8 wherein the exterior of said tubular frame is conically tapered, said tubular frame being of minimum diameter at the diaphragm end and of maximum diameter at the annular lip end, said taper being effective to centrally locate said sealing gland within the reservoir assembly and to establish a symmetrically distributed interface therein; and wherein said annular lip presents an arcuate face, said arcuate face extending across parallel sides, said parallel sides projecting inwardly from said tubular frame toward the longitudinal axis thereof.

11. The sealing gland of claim 8 wherein the exterior of said tubular frame is conically tapered between said annular lip and said diaphragm, said annular lip being disposed on a right cylindrical portion of said tubular frame, said right cylindrical portion being effective to establish predetermined sealing parameters for the peripheral seal; wherein said annular lip is configured to have a trapezoidal cross section, the nonparallel sides of said annular lip being disposed to converge toward the longitudinal axis of said tubular frame; and wherein a raised rim is peripherally disposed about the diaphragm end on said tubular frame.

12. The sealing gland of claim 8 wherein the exterior of said tubular frame is conically tapered between said annular lip and said diaphragm, said annular lip being disposed on a right cylindrical portion of said tubular frame, said right cylindrical portion being effective to establish predetermined sealing parameters for the peripheral seal; wherein said annular lip presents an arcuate face, said arcuate face extending across parallel sides, said parallel sides projecting inwardly from said tubular frame toward the longitudinal axis thereof; and wherein a raised rim is peripherally disposed about the diaphragm end on said tubular frame.