A container (51) for storage and dispensing of fluids, comprising collapsible front (54) and rear walls (56) defining a chamber, having a gland (50) defining a fluid passage for allowing the passage of fluids into the chamber carried on the front wall (54) of the container (51). The gland (50) includes a sealing land (59) within the container for sealingly engaging a heat sealable membrane (61) along a continuous seal upon the application of heat through the rear wall (56) of the container. The sealing land (59) in a pre-sealed condition, includes at least one thermo-deformable projection (64) having a raised profile providing an initial melt zone of reduced area relative to the area of the sealing land.
A sealable container, and a method for sealing a container

Field of the invention

The present invention relates to a sealable container, and to a method of sealing such a container. In particular, the invention relates to an aseptically sealable container, as well as to an aseptic seal for said container and an associated aseptic packaging fitment.

Background of the invention

Filling of pre-sterilised containers in an aseptic manner is known and various systems are employed which utilise different filling apparatus, different containers, and different sterilisation techniques. Typically, the container to be filled is produced in such a way as to ensure that the interior of the container is sterilised during manufacture. During the filling procedure, an inlet into the container is opened and a filling nozzle is used to fill the container with flowable material. The inlet is then sealed to thereby contain the flowable material within the container until dispensing is required. The resealing of the container after it is filled must be done in such a way that a proper seal is achieved so that contamination does not take place during subsequent storage and transportation.

Several related art patents have addressed the aforementioned problems such as the devices and methods disclosed in US 4,257,535 (Mellett), US 4,672,688 (Kalkipsakis) and US 4,605,378 (Anderson), each of which describe systems providing a sealable container having a filling port which is sealed from within the container.

US 4,257,535 and US 4,672,688 describe a container having an internal flap integral with the wall of the container. Once the container is filled, the filling port is sealed by urging the flap against a flange on the port, and heat sealing the flap to the filling port via a heating device located outside of the container so as to form an annular heat seal. US 4,605,378 describes a similar device and method. In other applications of the related art, an internal membrane is not used, rather the rear wall of the flexible container itself forms the welded closure.
The temperature required for sealing the port as described in US 4,257,535, US 4,672,688 and US 4,805,378 is typically in the range of from 160°C to 225°C, depending upon material characteristics and combined thicknesses of the rear container wall and the flap or membrane.

The above described documents provide a filling method that is commonly used in the aseptic and conventional packaging of fruit and vegetable pulp, juices and dairy products.

When using currently known devices and methods for the containment of fibrous and particulate products as discussed above, difficulty may be experienced in achieving satisfactory heat seals without entrapment of fibrous materials and particles within or across the seal. Another disadvantage experienced is the extended time required for heat penetration into the package from the external heat source under the limitations of the maximum temperature able to be employed without damage to the outer package layers.

A further disadvantage is experienced when alternative methods of heat sealing such as ultrasonic sealing are employed, whereby the ultrasonic transducer tends to damage the rearmost walls of the container configured as disclosed in the prior art, and does not achieve a satisfactory seal between the inner membrane and the filling port. The frictional energy required to perform the seal tends to be dissipated between the layers of intervening materials when sealing is attempted over an annulus of similar dimensions to conventional heat sealing methods.

Any discussion of documents, publications, acts, devices, substances, articles, materials or the like which is included in the present specification has been done so for the sole purpose so as to provide a contextual basis for the present invention. Any such discussions are not to be understood as admission of subject matter which forms the prior art base, or any part of the common general knowledge of the relevant technical field in relation to the technical field of the present invention to which it extended at the priority date or dates of the present invention.
Summary of the Invention

In broad terms, the present invention provides a container for storage and dispensing of fluids, said container comprising collapsible front and rear walls defining a chamber, a gland defining a fluid passage carried on the front wall for allowing the passage of fluids into the chamber, the gland including a sealing land within the container for sealingly engaging a heat sealable membrane along a continuous seal upon the application of heat through the rear wall of the container, wherein the sealing land, in a pre-sealed condition, includes at least one thermo-deformable projection having a raised profile providing an initial melt zone of reduced area relative to the area of the sealing land.

Preferably, the gland extends through an aperture defined in the collapsible front wall of the container, and includes a base flange located within the container, the sealing land being annular and being defined on an innermost face of the base flange, and the deformable projection comprising at least one annular lip.

Advantageously, the annular lip is shaped to define a cutting edge and is formed with at least one deflection surface for deflecting matter away from the initial melt zone upon the sealable membrane and the sealing land being urged towards one another.

The annular lip is preferably shaped so as to be generally triangular in cross-section, the apex of the triangular section defining the cutting edge.

Preferably the container is formed from a flexible heat resistant material which allows the heat sealable membrane to be abutted against the sealing land from the interior of the container by compressing and urging a portion of the wall of the container towards the sealing land and which allows heat to be transferred through the rear wall by a heating element to the melt zone. Advantageously the sealing membrane is carried on the sealing land prior to sealing.

Preferably, the heat sealable membrane includes a thermoplastic heat sealable layer proximate the sealing land for allowing the seal to be formed, and a distal non-heat sealable layer to prevent adherence of the sealing membrane to an inner surface of the rear wall of the container, prior to the heat sealable membrane being heat sealed to the sealing land.
The heat sealable membrane may be carried on the rear wall of the container prior to being heat sealed to the sealing land.

Preferably, the gland may include a rupturable membrane extending across an external opening of the passage such that the container is sealed prior to ingress of fluid into the container. The membrane may be rupturable by a delivery means, the delivery means being engageable with the gland prior to rupture of the rupturable membrane to provide for aseptic delivery of a fluid into the container.

Preferably the container includes a sealing land and a thermoplastic layer of the sealing membrane which are formed from thermoplastic materials adapted to melt and form said seal at a temperature in the range between 100°C and 265°C.

More preferably, the sealing land and a heat sealable layer of the sealing membrane may be formed from thermoplastic materials adapted to melt and form said seal at a temperature between 130°C and 200°C.

Advantageously, the sealing land may include a plurality of annular thermo-deformable projections in a spaced apart relationship.

The present invention also provides a gland defining a passage for providing a fluid pathway for delivery into and dispensing from a collapsible container comprising front and rear walls defining a chamber, the gland mountable within an aperture on the front wall of the container, the gland including a sealing land within the container for receiving a heat sealable membrane which is arranged to be heat sealed through the rear wall of the container to form a continuous seal wherein said sealing land, in a pre-sealed condition, includes at least one thermo-deformable projection having a raised profile providing an initial melt zone of reduced area relative to the area of the sealing land.

Preferably the gland is of generally annular form and the at least one deformable projection of the sealing land extends circumferentially around the passage to define a cutting edge prior to deformation to sever any fibrous material present between the deformable projection and the sealing membrane upon abutment to the container with a heating means.
Advantageously, the deformable projection may be of a generally triangular cross-section, the apex of the triangle defining a cutting edge.

Preferably the gland includes a rupturable membrane which, prior to rupture, extends across the passage so as to seal the passage of the gland prior to the ingress of contents.

More preferably, the gland may be engageable with a fluid delivery means in a manner so as to be ruptured upon engagement with the fluid delivery means.

In still a further aspect of the invention there is provided a method of sealing the gland of a container, the method comprising the steps of:

- providing a container having front and rear walls defining a chamber, and a gland carried on the front wall, the gland having a first end, a second end and a passage therethrough, the gland including a sealing land within the container for receiving a heat sealable membrane which is arranged to be heat sealed to the sealing land along a continuous seal, said sealing land, in a pre-sealed condition, including at least one projection having a raised profile for providing an initial melt or heat zone of reduced area relative to the area of the sealing land;

- providing a heat sealable membrane adjacent the sealing land and extending over the passage of the gland; and

- applying heat through the rear wall of the container to the heat sealable membrane using a heating means, and urging the heat sealable membrane and the sealing land towards each other;

wherein the deformable projection is configured such that upon abutment with the heat sealable membrane, the deformable projection and a thermoplastic layer of the sealable membrane are melted to form a seal between the heat sealable membrane and the sealing land thereby sealing the passage.

Preferably the heating means provides conductive and/or convective heat energy to the deformable projection and the sealable membrane. The heating means may heat the
deformable projection and the sealable membrane by frictional energy or by ultrasonic energy.

**Brief description of the drawings**

The invention now will be described, by way of example only, and with reference to the accompanying drawings in which:

Figure 1a shows a part sectional view of a gland and container of the related art prior to sealing;

Figure 1b shows an enlarged spot-sectional view of the gland and container of Figure 1a;

Figure 1c shows a part sectional view of the gland and container of Figure 1a after sealing;

Figure 1d shows an enlarged spot-sectional view of the gland and container of Figure 1c;

Figure 2a shows a part sectional view of a first embodiment of a gland and container according to the present invention prior to sealing;

Figure 2b shows an enlarged spot-sectional view of the gland and container of Figure 2a;

Figure 2c shows a part sectional view of the gland and container of Figure 2a after sealing;

Figure 2d shows an enlarged spot-sectional view of the gland and container of Figure 2c;

Figure 2e shows a partly cutaway underplan view of the gland of Figure 2a;

Figure 2f shows a triangular profile of a deformable projection in an embodiment of the gland of Figure 2a;
Figure 2g shows a trapezoidal profile of a deformable projection in an alternative embodiment of the gland of Figure 2a;

Figure 2h shows a rounded profile of a deformable projection of the gland in a further alternative embodiment of the gland of Figure 2a.

Figure 3a shows a part sectional view of a second embodiment of a gland and container according to the present invention prior to sealing;

Figure 3b shows an enlarged spot-sectional view of the gland and container of Figure 3a;

Figure 3c shows a triangular profile of the deformable projections of the gland of Figure 3a;

Figure 3d shows a trapezoidal profile of the deformable projections of an alternative embodiment the gland of Figure 3a; and

Figure 3e shows a rounded profile of the deformable projections of a further alternative embodiment the gland of Figure 3a;

15 Detailed description of the embodiments

The following description refers to preferred embodiments of a sealable container according to the present invention. To facilitate an understanding of the invention, reference is made in the description of the accompanying drawings whereby a gland as provided by the related art is described, and a gland according to the present invention is illustrated in a preferred embodiment.

Referring to Figures 1a to 1d, there is shown a gland 10 for sealing a container as typified by devices of the related art. The related art gland 10 is of general tubular form, sealed to a package or container 12 typically comprising one or more plastic film layers forming a front wall 14, and one or more plastic film layers forming a rear wall 16 of the container 12. The gland 10 is formed with a base flange 18, the outer face of which is
sealed to the front wall 19 of the container 12. A plastic film membrane 20 is partially attached to the inner face 21 of the base flange 18 at regions 23, 24.

In this example, the gland 10 further includes a rupturable membrane 25 sealed onto a top flange 27 of the gland 10 and being located outside of the container 12 to maintain the container in a non-contaminated state and allow for aseptic filling of the container 12.

As shown in Figure 1b, the flap membrane 20 allows fluid to pass between the gland 10 and the membrane 20 at zone 29. The area in which the heat seal closure is to occur is at zone 29, and the seal is formed via an annular contact area between the inner flat surface 21 of the base flange 18 of the gland 10 and the membrane 20.

One manner demonstrated in the related art by which the gland 10 may be sealed by the flap membrane 20 thereby sealing the container 12 is shown in Figure 1c. An annular copper heating element 30 is positioned at the rear wall but not in direct contact with it until after the container 12 is filled and prepared for sealing. The heating element 30, is advanced from the rear of the container 12 and urges the rear wall 16 towards the front wall 19 of the container 12 such that the flap membrane 20 is abutted to the innermost flange 21 at zone 32 as shown in more detail in Figure 1d. This causes the flap membrane 20 to fuse with the innermost flange so as to form an annular seal and seal the container 12. A broad annular seal contact area and indentation on melt-flow is indicated by 35. Sufficient heat and pressure need to be applied to the outer layer of the rear wall 16 of the container 12 to achieve satisfactory sealing performance of the flap membrane 20 by the heat sealer 30. In other examples of the related art, the rear wall 16 of the container is used as the flap. This can require the heating element 30 to be resident in the sealing position for some time in order to seal the container 12.

Referring to Figures 2a to 2f, a first embodiment of a gland 50 according to the present invention is shown in a container 51. The gland 50 has a fluid passage 52 to allow for ingress of flowable material for example liquids, suspended liquids, pulps and the like into the container 51. The container 51 has a front wall 54 and a rear wall 56. The gland 50 includes a base flange 58, the outer face of which is sealed to the front wall 54 of the container 51. The inner face 59 of the base flange 58 provides a sealing land 59
for a flap membrane 61. The gland may be sealed before filling by a film 53 extending across the passage 52.

Typically flap membrane 61, extends over the sealing land 59, and is arranged to be fully sealed to the sealing land 59 on application of heat from the heating element 30 through the membrane 61 in a similar manner as is outlined above with the previous reference to the related art technique.

The sealing land 59 includes a deformable projection 64 having a raised profile as shown in Figure 2b and in more detail in Figure 2f. The sealing land is of a width which corresponds to the width of the uppermost face 30A of the annular heating element 30, as well as the width of the side wall of the gland.

The deformable projection 64 is shaped and sized so that when the sealing membrane 61 is abutted against the deformable projection 64 under heat and pressure, an initial melt or heat zone is formed by the deformable projection 64 relative to the rest of the sealing land 59. Upon further pressure, the deformable projection 64 compresses and expands radially with respect to the passage 52 so as to be planar and provide a complete seal between the flap membrane 61 and the sealing land 59.

Referring to Figure 2e the gland 50 is shown in underplan view in a pre-sealed condition. The partial flap membrane 61 depicted in the figure may be attached at weld lines 65, 66 on the sealing land 59. The flap membrane extends in tension across the region of the deformable projection 64 and between the weld lines.

Because the flap membrane 61 is generally only partially attached to the gland at the weld lines 65,66 in the pre-sealed condition, upon engagement with a filling head (not shown) the resilient flange portion of the gland flexes downwardly, in response to the fluid pressure on the membrane. The flexure of the gland creates a void between the membrane 61 and the sealing land 59 allowing the sideways passage of fluid between the sealing membrane 61 and the sealing land 59 as indicated on the figure by arrows.

Turning to Figure 2f, it can be seen that an embodiment of the deformable projection 64 has a generally triangular cross section, tapering to a pointed apex region 67 defining a cutting edge. The severing of fibres present between the sealing land 59 and the
sealable membrane 61 reduces the incidence of fibrous material extending through the seal formed between the sealing membrane 56 and the surface of the land 54, thus reducing the likelihood of such fibres compromising the integrity of the seal. This provides for a more reliable seal.

In an alternate embodiment of the present invention shown in Figure 2g, the deformable projection 64 has a generally trapezoidal profile, with a flattened top region 68. This profile may assist in urging any fibrous material or other particles that may be trapped between the membrane 61 and the sealing land 59 immediately prior to the sealing process away from the sealing region. The combination of heat from the heating element and pressure cooperate to deform the projection and urge the material away from the sealing region.

In still a further embodiment of the present invention shown in Figure 2h, the deformable projection 64 has a generally rounded profile 71 which may also assist in urging fibrous and particulate material away from the sealing region during the sealing process.

The deformable projection 64, shown in the present embodiments of the invention, may be in the form of an annular lip extending around the passage 52 of the gland 50. The annular lip need not be continuous and may exist in the form of discrete entities which, upon application of heat and pressure, deform collectively to form the sealing land 59. In alternate embodiments, there may exist one or more continuous or discontinuous annular lips which, when heated and compressed, form the surface of the sealing land 59.

Furthermore, the annular lip has the additional feature of urging material such as seeds or pips, or other such particles away from the region at which the seal is to be initiated, thus providing for a complete seal in at least the initial deformation region. As will be appreciated, by ensuring a complete seal in at least one portion of the sealing land, the gland may be effectively and reliably sealed. Still further, the triangular cross-section of the annular lip as described in reference to the embodiments of the present application provides an initial wedge effect which may drive seeds or pips outwardly away from the initial melt zone as the heat sealable membrane is urged against the annular rib.
The alternate deformable projection profiles provided enhance localised heating and deformation of the projection, and may assist in severing of fibrous material and driving particulates away from the initial melt zone. The use of further alternate profiles according to various applications allows for further enhancement of localised heating thus providing a more efficiently and effectively formed seal.

Referring to Figures 3a to 3b a further embodiment of a gland 80 according to the present invention is shown. The gland 80 has a fluid passage 82 and the includes two deformable projections 84,86 in the form of concentric projections having a raised profile, (concentric with respect to the fluid passage 82 of the gland) extending from the sealing land 89.

Again, the deformable projections 84,86 are shaped and sized such that when a sealing membrane 91 is abutted against the deformable projections 84,86 under heat and pressure, the gland 80 is sealed in a similar manner as described with reference to the previous embodiments. Two initial heat or melt zones are provided by the deformable projections 84,86 relative to the remaining part of the sealing land 89. Both deformable projections 84,86 upon application of heat and pressure, are deformed towards the rest of the sealing land 89 as well as both radially inward and outward.

Turning to Figure 3c, it can be seen the deformable projections 84,86 of the gland of Figure 3b may be generally triangular in cross section, tapering to a pointed apex region defining a cutting edge. The severing of fibres present between the sealing land 89 and the sealable membrane 91 reduces the incidence of fibrous material extending through the seal formed between the sealing membrane 91 and the surface of the sealing land 89, thus reducing the likelihood of such fibres compromising the integrity of the seal, thereby providing a more reliable seal.

In an alternate embodiment of the present invention shown in Figure 3d, the deformable projections 84 may have generally trapezoidal profiles 97. This profile may assist in urging any fibrous material or other particles that may be trapped between the membrane 91 and the sealing land 89 immediately prior to the sealing process away from the sealing region. The combination of heat from the heating element and pressure cooperate to deform the projection and urge the material away from the sealing region.
In still a further embodiment of the present invention shown in Figure 3e, the deformable projection 84 may have a generally rounded profile 99 which may also assist in urging fibrous and particulate material away from the sealing region during the sealing process.

The present invention, by providing a localised heating zone for the sealing lands 59, 89 in the form of the deformable projections 64, 84, 86 may substantially reduce the temperature required of the heating element to form the seal. Still further, the time taken to perform the seal may be substantially reduced. Alternatively both the temperature required and the time taken to perform the seal may be substantially reduced in comparison with methods and devices of the related art which typically require a heating element temperature of 180 degrees Celsius to 200 degrees Celsius and a dwell time of 1.5 seconds to 4 seconds. The temperature of the heating element may be reduced to 140 degrees Celsius to 150 degrees Celsius for the same dwell time using the gland of the present invention.

The time taken to form a seal may be substantially reduced by up to about 30% or more. In turn, this means the incidence of damage to the container during sealing due to elevated temperatures and pressures is reduced, and the incidence of damage is also reduced due to the reduced cycle time taken to effect the seal. For sealable containers, for example those with a volume of 3 to 4 litres, this can mean a significant reduction in the total filling and sealing cycle time.

As described with reference to the embodiments shown in Figures 3a to 3c, the deformable projections 84, 86 of the gland 80 may be provided in the form of an annular lip of a generally triangular cross-section extending around the passage 72 of the gland 80.

In the embodiments shown in Figures 3a-3c and Figures 2a-2f the deformable projection 64, 84, 86, extends about 0.75 mm to 1 mm from the rest of the sealing land 59, 89 and has an apex defining a cutting edge. The triangular cross-section of the lip is preferably of equilateral triangular form and a base width of about 0.75 mm to 1 mm. The sealing land preferably has a width of in the range of from about 3 mm to about 5 mm. A significant advantage provided by the present invention is a gland 50, 80 which provides a more reliable seal, even in the event that a heating means or ultrasonic
transducer is misaligned with the sealing land 59,89. In such an event, the deformable projection(s) 64,84,86 which first contact the heating means or ultrasonic transducer with a flap membrane 61,91 disposed therebetween will form an initial melt zone and deform preferentially towards the rest of the sealing land surface 59,89 until the remaining part of the undeformed deformable projection is abutted with the heating means or ultrasonic transducer, which in turn becomes heated and deformed.

As will be appreciated, when misalignment occurs between a heating means or ultrasonic transducer and a gland of the prior art, the sealing land of the gland which is initially contacted and heated would need a significant amount of heat, pressure and time so as to be deformed to an extent that the remaining portion of the sealing land was then contacted and heated to form a suitably heated surface to effect a reliable seal. As significant heat, temperature and pressure would be required, the sealable membrane and/or container wall may be destroyed or at least partially compromised, resulting in an incompletely or weakly sealed gland, in comparison with that provided by the device and method according to the present invention.

During filling processes of containers of a relatively low volume whereby the time taken to seal a container is a significant portion of the filling and sealing cycle, it will be appreciated that the present invention provides a significant time reduction in the cycle whilst providing a reliable seal which allows for imperfections in alignment during the sealing cycle when used with both large and small volume containers.

A further feature provided by the present invention as embodied in the first and second embodiments may be the ability of the annular lip, at least initially to sev er fibrous material which may be present between the sealing land 59,89 as discussed previously. This reduces the incidence of fibrous material extending through the seal formed between the sealing membrane 61,91 and the sealing land 59,89 thus reducing the likelihood of such fibres compromising the integrity of the seal, thereby providing a more reliable seal.

Furthermore, the annular lip has the additional feature of urging material such as seeds or pips, or other such particles away from the region at which the seal is to be initiated, thus providing for a complete seal in at least the initial deformation region. As will be
appreciated, by ensuring a complete seal in at least one portion of the sealing land, the
gland may be effectively and reliably sealed. Still further, the triangular cross-section of
the annular lip as described in reference to the embodiments of the present application
provides an initial wedge effect which may drive seeds or pips outwardly away from the
initial melt zone as the heat sealable membrane is urged against the annular rib.

It will also be appreciated that the high pressure and reduced surface area contact point
thus formed between the sealing land 59,89 and the sealing membrane 61,91 as
provided by the present invention concentrates the transfer of heat between the two
parts and initiates the progression of melting and co-mingling of the compatible
materials more quickly and efficiently than a broader contact area as described in the
prior art.

Furthermore, in related art glands, in which the sealing gland is uni-planar and the
annular heating element is similarly uni-planar, any misalignment where the planes of
the respective heating element and sealing gland are not parallel will tend to
compromise the seal, or alternatively increase the time and/or temperature required to
perfect the seal. In the present invention, the relatively rapid deformation of the raised
profile under suitable conditions of heat and pressure will tend to be self-correcting in a
situation where the plane of the annular heating element is not uniformly parallel with
the plane defined by the upper edge of the raised profile.

The injection moulded gland may be produced from polyethylene of densities and
properties ranging from low density, "linear low density", medium density to blends with
a high density component. The polyethylene density is chosen to optimise various
parameters for the gland, including rigidity, flex, melt-flow and temperature resistance
required.

The bag wall materials may be made up of multiple layers in order to provide the
required attributes of barrier, moisture resistance, physical strength and heat sealability.

Typically the inner layers in contact with the product are low density polyethylene in
various forms, either as free layers or as an inner layer bonded or laminated to a poly
amide (nylon) layer or polyester layer. In the latter case, the resulting laminate may also
include an additional layer, such as aluminium foil, PVDC, EVOH, the layer selected to
provide properties such as gas, moisture or light barriers. The sealing land 59,89 and the sealing membrane, 61,91 are formed from materials which allow for co-mingling upon softening or melting so as to form the required seal. Numerous materials may be used, in particular thermoplastic polymeric materials, such as high density polyethylene (HDPE).

The sealing land and the sealing membrane are typically formed from polymeric materials which flow at localised temperatures in the range of from 130°C and 200°C so as to effect the seal. However, it will be appreciated that alternate polymeric materials which flow so as to form the seal at localised temperatures as low as 100°C and as high as 265°C may be used.

The sealing membranes are typically bonded laminations of various gauges. The inner face of the membrane adjacent to the gland is made from a low density polyethylene material that will suitably heat seal to the gland. The other side of the membrane is typically made from polyester (PET Film) of a grade that will not melt or heat seal to any of the polyethylene materials that are used at the temperatures specified. A polyamide material may also be used for the sealing membrane although may not have as desirable moisture absorption and extensibility properties.

As with the related art, the sealing membrane may be separate from the landing surface and may be present in the form of a flap member inside the container, or even be a portion of the wall of the container, without departing from the scope and spirit of the invention.

A rupturable seal 53,93 may be provided such that the present invention may be used in aseptic filling procedures, and the seal formed may be a hermetic seal so as to allow for the preservation of food or drink contents within the container.

Various other materials may also be used for each of the gland, sealing membrane and bag. For example, polycarbonate, PVC, polypropylene and other films are in various applications in liquid packaging either as single film or in combined form as co-extrusions or laminates may be suitable, provided that the materials relative melt points, and heat sealability to each other are monitored.
It will be understood that the invention disclosed and defined in this specification extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.

5 It will also be understood that the term "comprises" (or its grammatical variants) as used in this specification is equivalent to the term "includes" and should not be taken as excluding the presence of other elements or features.
CLAIMS:

1. A container for storage and dispensing of fluids, said container comprising collapsible front and rear walls defining a chamber, a gland defining a fluid passage carried on the front wall for allowing the passage of fluids into the chamber, the gland including a sealing land within the container for sealingly engaging a heat sealable membrane along a continuous seal upon the application of heat through the rear wall of the container, wherein the sealing land, in a pre-sealed condition, includes at least one thermo-deformable projection having a raised profile providing an initial melt zone of reduced area relative to the area of the sealing land.

2. A container as claimed in claim 1 wherein the gland extends through an aperture defined in the collapsible front wall of the container, and includes a base flange located within the container, the sealing land being annular and being defined on an innermost face of the base flange, and the deformable projection comprising at least one annular lip.

3. A container as claimed in claim 2 wherein the annular lip is shaped to define a cutting edge.

4. A container as claimed in claim 3 wherein the annular lip is formed with at least one deflection surface for deflecting matter away from the initial melt zone upon the sealable membrane and the sealing land being urged towards one another.

5. A container as claimed in claim 4 wherein the annular lip is generally triangular in cross-section, the apex of the triangular cross-section defining the cutting edge.

6. A container as claimed in any of the preceding claims formed from a flexible heat resistant material which allows the heat sealable membrane to be abutted against the sealing land from the interior of the container by compressing and urging a portion of the wall of the container towards the sealing land and which allows heat to be transferred through the rear wall by a heating element to the melt zone.

7. A container as claimed in claim 6 wherein the sealing membrane is carried on the sealing land prior to sealing.
8. A container as claimed in claim 7 wherein the heat sealable membrane includes a thermoplastic heat sealable layer proximate the sealing land for allowing the seal to be formed, and a distal non-heat sealable layer to prevent adherence of the sealing membrane to an inner surface of the rear wall of the container, prior to the heat sealable membrane being heat sealed to the sealing land.

9. A container as claimed in any one of claims 1 to 6 wherein the heat sealable membrane is carried on the rear wall of the container prior to being heat sealed to the sealing land.

10. A container as claimed in any one of the preceding claims wherein the gland further includes a rupturable membrane extending across an external opening of the passage such that the container is sealed prior to ingress of fluid into the container.

11. A container as claimed in claim 10 wherein the membrane is rupturable by a delivery means, the delivery means being engageable with the gland prior to rupture of the rupturable membrane to provide for aseptic delivery of a fluid into the container.

12. A container as claimed in any one of claims 1 to 11 wherein the sealing land and a thermoplastic layer of the sealing membrane are formed from thermoplastic materials adapted to melt and form said seal at a temperature in the range between 100°C and 265°C.

13. A container as claimed in any one of the preceding claims wherein the sealing land and a heat sealable layer of the sealing membrane are formed from thermoplastic materials adapted to melt and form said seal at a temperature between 130°C and 200°C.

14. A container as claimed in any one of the preceding claims wherein the sealing land includes a plurality of annular thermo-deformable projections in a spaced apart relationship.

15. A container as claimed in any one of the preceding claims wherein the thermo-deformable projection has a raised profile which is trapezoidal or curved.
16. A gland defining a passage for providing a fluid pathway for delivery into and
dispensing from a collapsible container comprising front and rear walls defining a
chamber, the gland mountable within an aperture on the front wall of the container, the
gland including a sealing land within the container for receiving a heat sealable
membrane which is arranged to be heat sealed through the rear wall of the container to
form a continuous seal wherein said sealing land, in a pre-sealed condition, includes at
least one thermo-deformable projection having a raised profile providing an initial melt
zone of reduced area relative to the area of the sealing land.

17. A gland as claimed in claim 16 wherein the gland is of generally annular form and
the at least one deformable projection of the sealing land extends circumferentially
around the passage to define a cutting edge prior to deformation.

18. A gland as claimed in any one of claims 16 or 17 wherein the deformable
projection is of a generally triangular cross-section, the apex of the triangle defining a
cutting edge.

19. A gland as claimed in any one of claims 16 to 18 which further includes a
rupturable membrane which, prior to rupture, extends across an exterior opening of the
passage so as to seal the passage of the gland prior to the ingress of contents.

20. A gland as claimed in claim 19 wherein the gland is engageable with a fluid
delivery means in a manner so as to be ruptured upon engagement with the fluid
delivery means.

21. A method of sealing the gland of a container, the method comprising the steps of:

   providing a container having front and rear walls defining a chamber, and a gland
carried on the front wall, the gland having a first end, a second end and a passage
therethrough, the gland including a sealing land within the container for receiving a heat
sealable membrane which is arranged to be heat sealed to the sealing land along a
continuous seal, said sealing land, in a pre-sealed condition, including at least one
projection having a raised profile for providing an initial melt or heat zone of reduced
area relative to the area of the sealing land;
providing a heat sealable membrane adjacent the sealing land and extending over the passage of the gland; and

applying heat through the rear wall of the container to the heat sealable membrane using a heating means, and urging the heat sealable membrane and the sealing land towards each other;

wherein the deformable projection is configured such that upon abutment with the heat sealable membrane, the deformable projection and a thermoplastic layer of the sealable membrane are melted to form a seal between the heat sealable membrane and the sealing land thereby sealing the passage.

22. The method of claim 21 wherein the heating means provides conductive and/or convective heat energy to the deformable projection and the sealable membrane.

23. The method of claim 22 wherein the heating means heats the deformable projection and the sealable membrane by frictional energy or by ultrasonic energy.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.
B65D 77/12 (2006.01) B65B 3/17 (2006.01) B65B 55/02 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI - IPC B65B, B65D-035, B65D-030, B65D-033, B65D-037, B65D-077, B31B-001 & Keywords
gland, outlet, port, seal, fuse, thermal, heat, membrane, film, projection, rib, collapsible, flexible, bag, pouch, aseptic, flange, rim, deform, melt and like terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C

See patent family annex

* *A* document defining the general state of the art which is not considered to be of particular relevance

*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

*E* earlier application or patent but published on or after the international filing date

*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

*O* document referring to an oral disclosure, use, exhibition or other means

*G* document member of the same patent family

Date of the actual completion of the international search
12 July 2006

Date of mailing of the international search report 27 JUL 2006

Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

ABID ALI
Telephone No: (02) 6283 2607

Form PCT/ISA/210 (second sheet) (April 2005)
### DOCUMENTS CONSIDERED TO BE RELEVANT

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