

1 PACKAGING ARRANGEMENT FOR CONTACT LENSES

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

5 This application is a continuation-in-part
 patent application of Serial No. 08/257,796, filed
 June 10, 1994; which is a continuation-in-part of Serial
 No. 08/146,754, filed November 2, 1993.

BACKGROUND OF THE INVENTION

10 1. Field of the Invention

 The present invention relates to a packaging
 arrangement for the containment of at least one
 hydrophilic contact lens in a sterile aqueous solution.
 More specifically, the invention pertains to a packaging
15 arrangement wherein a plurality of disposable
 hydrophilic contact lenses are contained in a specific
 number of individual packaging arrangements adapted to
 be collectively housed in a box-like container or carton
 so as to provide a specified or essentially measured
20 supply of contact lenses for use by a consumer over a
 predetermined period of time.

 In particular, the invention is directed to
 the aspect of providing an improved attachment between
 the base members of blister packages housing the contact
25 lenses, and a flexible cover sheet utilized for sealing
 engagement with the base members.

 The packaging of hydrophilic contact lenses in
 a sterile aqueous solution is well known in the contact
 lens manufacturing technology. In particular, such
30 packaging arrangements generally consist of so-called
 blister packages which are employed for the storage and

- 1 dispensing of the hydrophilic contact lenses by a
medical practitioner or to consumer who intends to wear
the contact lenses. Generally, such hydrophilic contact
lenses, which may be disposable after a single wear or
5 short-term use, are manufactured from suitable
hydrophilic polymeric materials. These materials may
be, amongst others, copolymers of hydroxyethyl
methacrylate containing from about 20% to 90% or more of
water, depending upon the polymer composition.
- 10 Generally, such contact lenses must be stored in a
sterile aqueous solution, usually in isotonic saline
solution in order to prevent dehydration and to maintain
the lenses in a ready-to-wear condition.

15 2. Discussion of the Prior Art

- Heretofore, contact lens manufacturers
normally utilized stoppered glass bottles containing
sterile saline solutions in which the hydrophilic
contact lenses were immersed as storage and shipping
20 containers for individual contact lenses. Each bottle
was sealed with a suitable silicone stopper and provided
with a metal closure as a safety seal in the
configuration of an overcap. When the contact lens was
intended to be removed from the bottle for use by a
25 patient, the metal closure safety seal was required to
be initially torn off the bottle, thereafter the stopper
withdrawn and the lens lifted out from the bottle
through the intermediary of a suitable plastic tweezer
or pouring the contents out. This entailed the
30 implementation of an extremely complicated procedure,
since the contact lens was difficult to grasp and remove

1 from the saline solution contained in the bottle due to
the transparent nature of the contact lens which
rendered it practically invisible to the human eye.

More recently, containments in the form of
5 blister packages have been developed for hydrophilic
contact lenses, and which enable the storage and
shipping of the hydrophilic contact lenses in a simple
and inexpensive expedient manner, while concurrently
facilitating the conveniently easy removal of the
10 contact lens by a practitioner or a patient.

For instance, a blister package which is
adapted to provide a sterile sealed storage environment
for a disposable or single-use hydrophilic contact lens,
wherein the lens is immersed in a sterile aqueous
15 solution; for example, such as in an isotonic saline
solution, is described in U.S. Patent No. 4,691,820 to
Martinez; which is assigned to the common assignee of
the present application, and the disclosure of which is
incorporated herein by reference.

20 Thus, in the above-mentioned Martinez U.S.
patent, the blister package for storing and dispensing a
hydrophilic contact lens includes an injection-molded or
thermoformed plastic base portion incorporating a molded
cavity which is surrounded by an outstanding planar
25 flange about the rim of the cavity. A flexible cover
sheet is adhered to the surface of the flange so as to
sealingly enclose the cavity in a generally liquid-tight
mode. Within the cavity of the base portion, a
hydrophilic contact lens is immersed in a sterile
30 aqueous solution, such as an isotonic saline solution.
A portion of the side wall of the cavity is inclined to

5 form a ramp extending upwardly towards the flange from the bottom of the cavity, and the cover sheet is adapted to be stripped from the flange in order to expose the cavity and inclined side wall thereof whereupon the lens may be readily manually removed by being slid upwardly and out of the cavity along the inclined ramp surface of the cavity.

10 Other embodiments of blister packages have the lens-containing cavity shaped to be of an essentially semi-spherical configuration which is dimensioned so as to be adapted to closely support the contact lens therein immersed in an aqueous solution for ease of removal and also to facilitate an inspection process, as disclosed in copending U.S. Patent Application Serial
15 Nos. 08/414,513 and 08/414,515 (Attorney's Docket Nos. VTN-169, 9014Z-I and VTN-170, 9014Z-II), also commonly assigned to the assignee of the present application.
20 Moreover, the foregoing construction primarily considers the utilization of such blister packages for the dispensing of individual contact lenses, with such blister packages being ordinarily separate or single packagings, which may then be housed in larger
25 quantities in a further container, such as a rigid cardboard or paperboard carton of usual construction employed for the retail sales of the lenses.

30 It is an important aspect to be able to furnish a user of such disposable hydrophilic contact lenses with a specific supply of contact lenses, the latter of which are normally worn for only a single day; in essence, for ordinarily 8 to 18 hours within a 24-

1 hour period and thereafter discarded. Hereby, the
packaging of a supply of contact lenses should enable
the user to store and provide indication for
replenishing the supply of contact lenses at regular
5 intervals; for example, at periods of 5, 10, 15, 30 days
or even longer. Consequently, provision is made for
packaging arrangements including specified quantities of
such hydrophilic contact lenses contained in blister
packages, such as being in suitable interconnected
10 arrays, wherein these packaging arrangements are adapted
to be boxed in a carton enabling a rapid and precise
determination as to the quantity of hydrophilic contact
lenses contained therein, and with such packaging
arrangements being of a compact nature which is
15 completely protective of the hydrophilic lenses.

SUMMARY OF THE INVENTION

In essence, the inventive concept pertains to
packaging arrangements in which a plurality of blister
20 packages each has a cavity containing respectively one
hydrophilic contact lens in a sterile aqueous solution.
A specified quantity of such blister packages has the
molded plastic base members thereof each containing a
contact lens positioned in a contiguous array, and is
25 initially covered by a single flexible cover sheet
constituted of a laminated foil or other materials, such
as metallized PET, PC to enhance barrier properties, or
a layer of the laminate structure including silicon
oxide on a plastic laminate to provide barrier
30 properties in order to provide a sealed environment for
each of the contact lenses contained in the cavity

1 formed in each base member. The flexible cover sheet
may be dimensioned to cover a single base member to
provide an individual or single packaging arrangement,
or, in an alternative concept, may be in the form of
5 strips whereby adjoining base members are severable
interconnected to enable the dispensing of individual
blister packages each containing one of the hydrophilic
contact lenses as may be required by a user. In
particular, a plurality of such arrays of packaging
10 arrangements for contact lenses, which arrays or
individual blister packages are adapted to be arranged
in one or more containers.

Each of the blister package base members,
which may possess a substantially rectangular
15 outstanding planar flange encompassing a respective
contact lens receiving cavity formed therein, the latter
of which may be offset towards one end of the flange,
and may incorporate integral support structure
formulating rigidly supported and compact packaging
20 arrangements such that the cavities containing the
hydrophilic contact lenses of superimposed arrays are
substantially protected against potentially damaging
external influences, such as shocks or impacts which may
be imparted thereto during handling thereof.

25 Each molded plastic base member of a blister
package may be constituted from a suitable injection
molded or thermoformed thermoplastic sheet material,
such as, for instance, polypropylene, PET, PC and other
thermoplastic materials; whereas the flexible cover
30 sheet may be constituted of a laminate or other type of
barrier material, as mentioned hereinabove, suitably

1 imprinted and which is adapted to be heat-sealed to the
flange extending about the cavity of the package
containing the hydrophilic contact lens. The flexible
cover sheet may be of a material composition and
5 imprinted in a novel manner as is disclosed in copending
U.S. Patent Application Serial No. 08/106,386; filed on
August 13, 1993; entitled "Method of Double-Sided
Printing of a Laminate and Product Obtained Thereby",
commonly assigned to the assignee of the present
10 application and the disclosure of which is incorporated
herein by reference.

In many instances, when arrays of blister
packages are formed, in essence, with the base members
having the cavities therein containing the hydrophilic
15 contact lenses, the individual base members are
positioned on a production line so as not to be in
direct contact with each other or only in a closely
spaced relationship, whereby the superposition thereon
of the flexible cover sheet is implemented through
20 apparatus which does not always accurately position the
cover sheet over the collective sequentially spaced
blister package base members. Consequently, although
the surfaces of the flexible cover sheets facing the
individual base members may provide adequate sealing
25 adherence about the periphery or confines of the
cavities containing the contact lenses, it may be
necessary to provide engagement with at least peripheral
surface portions of the flanges extending in spaced
relationship about the cavities to form essentially
30 closed and peripherally sealed blister packages without
the need for the provision of adhesive materials.

1 In order to achieve the foregoing sealing or
joining effect between the base members and the flexible
cover sheet, each of the base members as described
hereinbelow may have the peripheral edges of the flange
5 surface provided with a continuously extending groove or
recess extending proximate the periphery thereof, so as
to enable a pressure die having a configuration
complementary to the shape of the groove to force the
superimposed flexible cover sheet into sealing
10 engagement with the peripheral groove. Thereafter, the
cover sheet may be trimmed and severed to form
individual blister packages while permitting the
material of the flexible cover sheet which is engaged in
the flange groove to form a sealing adherence with the
15 groove wall structure. A corner of the package may be
reduced in size in order to more easily enable grasping
of the lid or cover sheet so as to start the removal
thereof from the package. This will enable the
formation of the individual blister packages, each
20 containing respectively one of the hydrophilic contact
lenses without the need of having to precisely position
the continuous flexible cover sheet over the sequence of
blister packages being produced.

 Although the foregoing is described with
25 regard to blister packages each containing a hydrophilic
contact lens in a generally semi-spherical cavity, this
inventive concept is equally applicable to blister
packages having the cavity in the shape of a generally
rectangular configuration with one upwardly sloping ramp
30 surface as shown in the above-mentioned U.S. Patent No.
4,691,820 to Martinez. In that instance, it is also

1 possible to form a peripheral groove in the edge portion
of the flange surface extending about the rectangular
confines of the base member so as to enable the pressure
die to force the material of the flexible cover sheet
5 into engagement with the peripheral groove, thereby
forming a sealing connection with the base member. The
groove additionally serves to prevent the foil or
material of the cover sheet from extending beyond the
edges of the blister package or base member which,
10 conceivably, could cause jams to occur in downstream
processing equipment during production. An embossing
die which tucks the cover sheet material into the
peripheral groove on the base member is chamfered at one
corner so as not to tuck the material into the groove as
15 far at that location. This serves as the point at which
the user may grasp the flexible cover sheet and detach
and remove it from the base member. A tip of embossing
die is designed to "iron out" wrinkles that form
naturally during the actual pressing of the foil. In
20 other words, simply tucking foil will cause wrinkling,
but this die deforms (draws) the material during
insertion so that no wrinkles appear.

Accordingly, it is an object of the present
invention to provide a novel construction for blister
25 packages each containing a cavity housing a hydrophilic
contact lens immersed in an aqueous solution, whereby a
flexible cover sheet is adhered to periphery of a flange
of the base portion of the blister package through
interengaging surface structure of the components.

30 A more specific object of the present
invention is to provide blister packages for the

1 containment of hydrophilic contact lenses, wherein a
planar flange structure of a base member of the package
has a peripheral groove formed therein and extending
along the edges thereof, into which groove there may be
5 sealingly engaged the material of a flexible cover sheet
to provide an attachment of the cover sheet to the base
member, while preventing the material from extending
beyond the edges of the base member through imparting a
reduced size to a corner of the package to mate with a
10 particular section of the embossing die.

Yet another object of the present invention is
to provide a method of attaching a flexible cover sheet
to a flange portion of a base member for a blister
package through effectuating a mechanical sealing
15 engagement between the material of the flexible cover
sheet and a groove structure formed in the flange.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference may now be had to the following
20 detailed description of an exemplary embodiment of the
invention, taken in conjunction with the accompanying
drawings; in which:

Figure 1 illustrates a top plan view of a base
portion of a blister package base member pursuant to the
25 invention;

Figure 2 illustrates a bottom view of the base
member;

Figure 3 illustrates a side view of the base
member;

30 Figure 4 illustrates an end view of the base
member;

1 Figure 5 illustrates a sectional view taken
along line 5-5 in Figure 1;

5 Figure 6 illustrates, on an enlarged scale, a
fragmentary view of the edge portion of the base member
shown in the encircled portion A of Figure 5;

 Figure 7 illustrates a typical pressure die
which is adapted to force the material of a flexible
cover sheet into a peripheral groove formed in the base
member of the blister package;

10 Figure 8 illustrates an enlarged sectional
fragmentary view taken in the encircled portion B of
Figure 7; and

 Figure 9 illustrates, generally
diagrammatically, the blister package of Figure 1, shown
15 with the cover sheet adhered thereto.

DETAILED DESCRIPTION

 Referring now in specific detail to an
embodiment of a blister package construction, there is
20 illustrated a base member 10, as shown in Figure 1,
which has a planar flange 12 of generally rectangular
configuration in plan view, and which possess rounded
end corners 14, although if desired it is also possible
to produce the flange 12 with sharp end corners.

25 Offset towards one end of the flange 12 is a
cavity 16 which, in this instance, is of generally semi-
circular configuration and which is adapted to receive
therein a hydrophilic contact lens which is immersed in
a sterile saline solution, as is well known in the
30 technology.

1 Molded into the planar flange 12 proximate the
cavity 16 is an indentation or depression 18, which may
be of a generally frusto-conical planar configuration,
which is coextensive and spaced from the perimeter of
5 the cavity 16, and wherein the depression 18 is formed
primarily for the purpose of reinforcing the planar
flange 12 and to strengthen the latter against lateral
deflection tending to break the seal about the cavity 16
formed with a cover sheet. Imparting pressure against
10 the flexible cover material in this region may also
assist in detaching the former from its engagement with
the base member.

Formed along the periphery of the rectangular
flange 12 and slightly offset inwardly of the edge
15 thereof is a continuous peripheral groove 24 which
imparts a stiffening strengthening to the structure of
the flange, with an increased radius at one or two
corners 14a to allow the user to attain an easier grip
on the lid or flexible cover sheet. The peripheral
20 groove 24 is adapted to be covered, as is the remaining
flange surface, by a flexible cover sheet of the type as
described hereinabove, and whereby the surface of the
flexible cover sheet extending about the cavity 16
containing the contact lens is adhesively fastened
25 thereto.

In order to provide a sealing or clamping
engagement between the surface of the flange 12 facing
flexible cover sheet and the latter, a suitable pressure
die 30 having a protrusion 32 coextensive with the
30 perimeter of the groove in the flange 12 is forced
downwardly into engagement with the surface of the

1 flexible cover sheet so as to force the material thereof
into the groove extending along the perimeter of the
flange of the blister package base member. The width
and depth of the groove is dimensioned to cause a
5 clamping engagement to take place with the flexible
cover sheet material which is forced therein by the die
30, so as to essentially provide a mechanical sealing
engagement between the cover sheet and the flange 12 of
the blister package base member within the confines of
10 the peripheral groove.

In case of an embodiment in which the material
of the cover sheet forms an interconnecting strip with
portions thereof located externally of the perimeter of
the blister package base member, such material may be
15 severed or suitable weakening lines formed therein in
order to form a continuous array or strip of a
predetermined number of detachably interconnected
blister packages.

With respect to the foregoing, although the
20 invention has been described with regard to a blister
package having a generally semi-spherical cavity 16 for
receiving a contact lens, it is also equally applicable
to the flange structure disclosed in U.S. Patent No.
4,691,820 to Martinez by simply molding a groove into
25 the peripheral edge portion of the generally rectangular
flange portion of the base member. This will enable the
material of the flexible cover sheet to be pressed into
the groove by means of the pressure die, as described
hereinabove, and which will provide for a sealing
30 engagement analogous to that in the previously described
embodiment.

1 From the foregoing it becomes readily apparent
that by means of the invention incorporating the
peripheral groove in the flange portion of a base member
for a blister package, through a simple cooperating
5 pressure die structure, it is possible to cause the
superimposed flexible cover sheet to come into
clampingly sealing engagement with the peripheral groove
in the flange portion to resultingly form a mechanical
seal between the flexible cover sheet and the periphery
10 of the base member of the blister package. This will
enable the production of blister packages in a
continuous and sequential manner without the necessity
for having to consider minor deviations and tolerances
in the positioning of the flexible cover sheet over
15 subsequent or sequentially produced blister packages,
inasmuch as the latter will always be aligned in
cooperation with the pressure die superimposed thereover
for the formation of the sealing engagement with the
groove in the base member.

20 While there has been shown and described what
are considered to be preferred embodiments of the
invention, it will, of course, be understood that
various modifications and changes in form or detail
could readily be made without departing from the spirit
25 of the invention. It is, therefore, intended that the
invention be not limited to the exact form and detail
herein shown and described, nor to anything less than
the whole of the invention herein disclosed as
hereinafter claimed.

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1 WHAT IS CLAIMED IS:

1. A packaging arrangement for the sealed containment of at least one hydrophilic contact lens in a sterile aqueous solution; comprising:

- 5 (a) at least one injection molded or thermally formed plastic base member having a cavity for containing a contact lens immersed in said solution, said base member including a flange extending outwardly about the periphery of said cavity, said cavity
10 consisting of an indentation extending from the plane of said flange of said base member and a continuous groove formed in the plane of said flange and extending closely inwardly of the peripheral edge of said flange; and
15 (b) a flexible cover sheet superimposed over said base member and dimensioned to be detachably sealed to a surface area of said flange extending about said cavity and including said cover sheet having the portions thereof located in alignment with said
20 peripheral groove depressed into said groove so as to form a clamping engagement with said flange coextensive with said continuous groove.

2. A packaging arrangement as claimed in Claim 1, wherein said flexible cover sheet has an expanse which is dimensioned to be within the confines
25 of the peripheral edges of said base member.

3. A packaging arrangement as claimed in Claim 1, wherein said flexible cover sheet is dimensioned to interconnect a plurality of said base members in a striplike array for the containment of a
30 specified number of said contact lenses arranged one in each cavity of each of said base members.



1 4. A packaging arrangement as claimed in
Claim 3, wherein said flexible cover sheet commonly
extends over said plurality of base members and is
sealingly connected to each said flange of respectively
5 each said base member.

 5. A packaging arrangement as claimed in
Claim 4, wherein said flexible cover sheet is adapted to
connect said plurality of base members in a coplanar
array.

10 6. A packaging arrangement as claimed in
Claim 2, wherein said packaging arrangement comprises an
individual blister each containing a single contact
lens.

 7. A packaging arrangement as claimed in
15 Claim 2, wherein said flexible cover sheet having a
substantially rectangular configuration.

 8. A packaging arrangement as claimed in
Claim 1, wherein said flange is rectangular and the
cavity in said molded plastic base member is offset
20 towards one edge of said flange within the peripheral
confines of said continuous groove.

 9. A packaging arrangement as claimed in
Claim 1, wherein said flange has a generally planar
surface configuration facing said superimposed cover
25 sheet in contacting relationship.

 10. A packaging arrangement as claimed in
Claim 9, wherein a seal is formed between said cover
sheet and the planar surface of said flange sealingly
encompassing the peripheral edge of said cavity.

30 11. A packaging arrangement as claimed in
Claim 10, wherein said seal comprises a heat seal.



1 12. A packaging arrangement as claimed in
Claim 1, wherein said molded plastic base member is
constituted of a thermoformable polymer material.

5 13. A packaging arrangement as claimed in
Claim 1, wherein said flexible cover sheet is a multi-
layered laminate having an outer layer of said laminate
consisting of a thermoplastic film contacting the
surface of the flange of said molded plastic base
member.

10 14. A packaging arrangement as claimed in
Claim 13, wherein said thermoplastic film is heat sealed
to said flange surface of the base member for sealing
the cavity containing the contact lens.

15 15. A packaging arrangement as claimed in
Claim 1, wherein said base member and said flexible
cover sheet conjointly form a moisture and vapor-
imperviously sealed containment for said contact lens in
said cavity.

20 16. a packaging arrangement as claimed in--
Claim 13, wherein said flexible cover sheet comprises a
foil laminate.

25 17. A packaging arrangement as claimed in
Claim 13, wherein said flexible cover sheet comprises at
least one barrier layer intermediate a plurality of
plastic layers.

 18. A packaging arrangement as claimed in
Claim 1, wherein said cavity has a curvilinear
configuration in substantial conformance with the shape
of the contact lens adapted to be contained therein.

30 19. A packaging arrangement as claimed in
Claim 1, wherein said groove has a cross-section



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1 dimensioned to clampingly engage the thicknesses of the
flexible cover sheet which is pressed into said groove.

20. A packaging arrangement as claimed in
Claim 19, wherein the material of said flexible cover
5 sheet is pressed into said groove in the flange through
the application of an embossing die.

21. A packaging arrangement as claimed in
Claim 20, wherein said embossing die includes a raised
pressing surface aligned in conformance with the
10 peripheral dimensions of said groove in said groove.

22. A packaging arrangement as claimed in
Claim 1, wherein an indentation is formed in the surface
of said flange intermediate said cavity and said
peripheral groove.

15 23. A packaging arrangement as claimed in
Claim 1, wherein a reduced radius is incorporated into
an edge or corner portion of said flange to enable
grasping of said flexible cover sheet and removal
thereof from said base member by a user.

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