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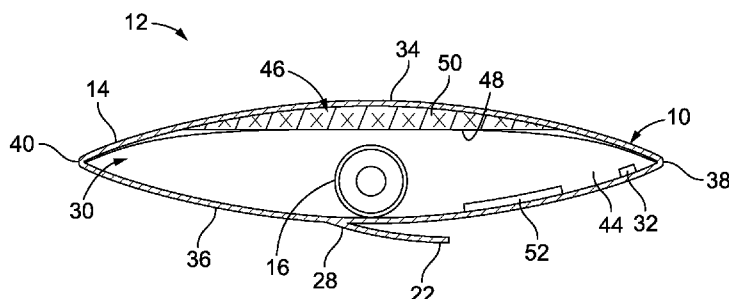
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(54) **Title:** PACKAGES FOR VAPOR-HYDRATED URINARY CATHETERS

**FIG. 2**

(57) **Abstract:** A catheter assembly (12) includes a catheter (16) and a catheter package (10). At least a portion of the catheter includes a coating which produces a low-friction surface on the catheter when treated with an activating substance. The catheter package defines an interior space (30) divided into a catheter-containing compartment (44) and a hydration compartment (46) by a gas-permeable, liquid-impermeable barrier (48). A vapor-donating liquid is positioned within the hydration compartment, while at least one liquid-absorbent member (52) is positioned within the catheter-containing compartment.



PACKAGES FOR VAPOR-HYDRATED URINARY CATHETERS

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RELATED APPLICATION

This application claims the benefit of and priority of U.S. Provisional Patent Application Serial No. 61/898,529, filed November 1, 2013, the contents of which are incorporated by reference herein.

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DESCRIPTIONTECHNICAL FIELD

The present disclosure generally relates to urinary catheters. More particularly, the present disclosure relates to packages for vapor-hydrated urinary catheters.

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BACKGROUND

Intermittent catheterization is a good option for many users who suffer from various abnormalities of the urinary system. Such catheters are typically provided as single use, individually packaged items and may include a gel-lubricant or hydrophilic coating as a lubricant for reducing friction during insertion into the urethra.

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Regarding gel-coated catheters, a user applies a gel-lubricant, such as a water-based gel-lubricant, to the surface of the catheter, which reduces friction for ease of insertion into the urethra. In some instances, the gel-lubricant is supplied with the packaged catheter, in which case the gel-lubricant may be applied to the catheter surface just before or during the packaging operation or as the catheter is being inserted by the user.

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When a hydrophilic material is used as a lubricant, a thin coating of hydrophilic material is adhered to the outer surface of the catheter. When this coating is activated by swelling in contact with a hydrating liquid such as water, it provides a surface having an extremely low coefficient of friction. One form of this product provides a sterile, individually packaged, single-use catheter in a dry state or condition. The user opens the package, pours water into the package, waits 30 seconds, and then removes the catheter from the package, now ready for

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insertion. Other embodiments provide the amount of liquid water necessary for immersion of the catheter in a separate compartment of the package. In such embodiments, the user must open the separate compartment of the package to allow the liquid immersion water to enter the catheter-containing chamber for
5 direct contact with the hydrophilic coated surface. The catheter is then removed from the package and inserted into the urethra. In yet another embodiment, the catheter is provided in a package that already contains enough loose liquid water to cause it to be immersed. In such an embodiment, the user simply opens the package and removes the catheter therefrom, and then inserts the catheter into
10 the urethra, without the need to add water.

In all of these existing products, the catheter depends upon direct contact of the liquid swelling medium (e.g., liquid water) with the entirety of the hydrophilic coated catheter surface. Moreover, all of these existing products achieve this direct liquid water contact by providing a package for the catheter that permits
15 liquid water to flow freely within the cavity of the package, and permits unobstructed access to the catheter surface. Because of the free flow of loose liquid water within the package and unobstructed access to the catheter surface, it is easy to ensure direct contact of the liquid swelling medium with the entire surface of the catheter that has been treated with the hydrophilic coating.

20 A disadvantage of the hydrophilic coated catheters described above is that the immersion liquid has a tendency to spill from the package as the user handles the catheter and tries to remove it for subsequent insertion. More recent approaches, such as the VaPro™ catheter from Hollister Incorporated of Libertyville, Illinois, provide a package with separate compartments for the
25 catheter and a water reservoir. In the water reservoir compartment, there is provided a wick or liquid-sequestering element made of an absorbent material, such as fabric or paper or foam. The wick is wetted with a liquid, such as water, prior to the compartments being sealed. The compartments are separated by a vapor-permeable film through which water vapor from the wick passes to contact
30 and hydrate the catheter in the other compartment. Catheter packages employing a wick are described in greater detail in U.S. Patent Nos. 8,205,745 and 8,356,457 to Murray et al. and in U.S. Patent Application Publication Nos. 2009/0131917 to Kavanagh et al. and 2012/0228165 to Murray et al., all of which

are incorporated herein by reference.

SUMMARY

There are several aspects of the present subject matter which may be embodied separately or together in the devices and systems described and claimed below. These aspects may be employed alone or in combination with other aspects of the subject matter described herein, and the description of these aspects together is not intended to preclude the use of these aspects separately or the claiming of such aspects separately or in different combinations as set forth in the claims appended hereto.

In one aspect, a catheter assembly includes a catheter and a catheter package. At least a portion of the catheter includes a coating which produces a low-friction surface on the catheter when treated with an activating substance. The catheter package defines an interior space divided into a catheter-containing compartment and a hydration compartment by a gas-permeable, liquid-impermeable barrier. A vapor-donating liquid is positioned within the hydration compartment, while a liquid-absorbent member is positioned within the catheter-containing compartment.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view of an embodiment of a package for a urinary catheter according to an aspect of the present disclosure;

Fig. 2 is a cross-sectional view of the package of Fig. 1, taken along the line 2-2 of Fig. 1;

Fig. 3 is a plan view of a second embodiment of a package for a urinary catheter according to an aspect of the present disclosure;

Fig. 4 is a cross-sectional view of the package of Fig. 3, taken along the line 4-4 of Fig. 3;

Fig. 5 is a plan view of a third embodiment of a package for a urinary catheter according to an aspect of the present disclosure;

Fig. 6 is a cross-sectional view of the package of Fig. 5, taken along the line 6-6 of Fig. 5;

Fig. 7 is a plan view of a fourth embodiment of a package for a urinary

catheter according to an aspect of the present disclosure;

Fig. 8 is a cross-sectional view of the package of Fig. 7, taken along the line 8-8 of Fig. 7;

Fig. 9 is a plan view of a fifth embodiment of a package for a urinary catheter according to an aspect of the present disclosure;

Fig. 10 is a cross-sectional view of the package of Fig. 9, taken along the line 10-10 of Fig. 9;

Fig. 11 is a plan view of a sixth embodiment of a package for a urinary catheter according to an aspect of the present disclosure;

Fig. 12 is a cross-sectional view of the package of Fig. 11, taken along the line 12-12 of Fig. 11;

Fig. 13 is a plan view of a seventh embodiment of a package for a urinary catheter according to an aspect of the present disclosure; and

Fig. 14 is a cross-sectional view of the package of Fig. 13, taken along the line 14-14 of Fig. 13.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

The embodiments disclosed herein are for the purpose of providing a description of the present subject matter, and it is understood that the subject matter may be embodied in various other forms and combinations not shown in detail. Therefore, specific embodiments and features disclosed herein are not to be interpreted as limiting the subject matter as defined in the accompanying claims.

Figs. 1 and 2 illustrate an embodiment of a catheter package 10 of a catheter assembly 12. The catheter package 10 may be variously configured without departing from the scope of the present disclosure, but in one embodiment, the catheter package 10 may be defined by a sheet material 14 wrapped about a urinary catheter 16 (Fig. 2) to form a sealed container for the catheter 16. The catheter 16 may have a hydrophilic coating on at least part of an insertable portion thereof and extends generally longitudinally within the package 10, with the sheet material 14 extending from beyond the proximal end to beyond the distal end of the catheter 16. The illustrated sheet material 14 is wrapped about the catheter 16 so as to have confronting proximal and distal end sheet

edges 18 and 20 (Fig. 1) and confronting side sheet edges 22 (Fig. 2). The confronting proximal and distal end sheet edges 18 and 20 and the confronting side sheet edges 22 of the sheet material 14 may be sealed as at 24, 26, and 28 to define a sealed cavity or interior space 30 for the catheter 16. A tear strip 32 (Fig. 1) may be affixed to the sheet material 14 to cause the sheet material 14 to tear along the tear strip 32 to thereby cause the package 10 to open along an intended opening line as defined by the tear strip 32.

In the illustrated embodiment, the tear strip 32 extends within the interior space 30 in a desired direction relative to the catheter 16 to cause the package 10 to open along the intended opening line so as to facilitate removal of the catheter 16 from the package 10 for use thereof. The tear strip 32 may be adhesively or otherwise affixed to an inner surface of the sheet material 14 within the interior space 30 and may extend from the sealed proximal end sheet edge 18 to the sealed distal end sheet edge 20 in generally parallel relation to the catheter 16. The sheet material 14 may be a liquid-tight, gas-impermeable foil coated with a heat seal layer, with the tear strip 32 being formed of a suitable material, such as polyester having a polyethylene backing, and the tear strip 32 being adhesively or otherwise affixed in position within the interior space 30 on the inner surface of the sheet material 14.

The package 10 may be variously configured, provided that it is properly suited for enclosing the catheter 16. For example, the package may comprise two sheets of material that are sealed together about the edges of the sheets to form the package or may be a single sheet of material that is folded onto itself and sealed about three edges to define an enclosure. Additionally, shape of the package may vary, such as having a relatively short and wide rectangular or square shape or a circular or rounded shape. The package may also be configured to contain the catheter in a coiled or otherwise non-linear, compact configuration. Other variations to the package design and configuration may also be employed without departing from the scope of the present disclosure.

In the illustrated embodiment, the package 10 has a generally rectangular shape, which may be considered to have a front panel 34 and a rear panel 36 (Fig. 2), with a single longitudinal seal 28 formed in the middle of the rear panel 36. It will, therefore, be appreciated that in the embodiment of Figs. 1 and 2, the

tear strip 32 is adhesively or otherwise affixed to the inner surface of the sheet material 14 so as to be positioned along one side edge of the package 10. In this configuration, the front panel 34 and the rear panel 36 define a pair of parallel side edges 38 and 40, and the tear strip 32 is adhesively or otherwise affixed to an inner surface of the sheet material 40 so as to be positioned along one of the two parallel side edges 38 and 40 (i.e., the side edge 38 in the illustrated embodiment).

Still referring to Figs. 1 and 2, the seals 24 and 26 joining the confronting proximal and distal end sheet edges 18 and 20 form end seals at opposite ends of the catheter 16 and the seal 28 joining the confronting side sheet edges 22 forms a single longitudinal seal generally parallel to the catheter 16. As previously described, the sheet material 14 may be a liquid-tight, gas-impermeable foil, in which case the end seals 24 and 26 and the single longitudinal seal 28 may be formed as weld seals with one of the end seals 24 being formed longer than the other of the end seal 26. As shown in Fig. 1, the end seal 24 which is formed longer than the other end seal 26 may have at least one, and preferably two, holes or openings 42 and a tear line 33 extending from the side edge 40, between and adjacent to the holes 42, and to a point adjacent the other side edge 38. With the tear line 33 so configured, the user can use one or both of the holes 42 (e.g., by inserting a finger or digit therein) to propagate the separation in the package 10 along the tear line 33, which leads to the tear strip 32, which will thereafter cause the sheet material 14 to tear along the tear strip 32 to thereby cause the package 10 to open along the intended opening line (i.e., the side edge 38). Other tear strip or opening configurations may also be employed without departing from the scope of the present disclosure. For example, any package according to the present disclosure may eliminate the tear strip, with at least a portion of the package being formed of a directional tear material. In another exemplary embodiment, a tear tape may be associated with the outer surface of the package.

In one preferred embodiment of the catheter assembly 12, the interior space 30 of the package 10 may be divided into two compartments 44 and 46 by a barrier 48 (Fig. 2). The barrier 48 is preferably formed of one or more sheets or layers of a gas-permeable, liquid-impermeable material and may be secured to the inner surface of the sheet material 14 of the package 10 by any suitable

means, such as a heat seal. The catheter 16 is positioned within one of the compartments 44, which is referred to herein as the catheter-containing compartment or the device compartment 44. A vapor or hydration source is provided within the other compartment 46, which is referred to herein as the hydration compartment or the water reservoir compartment 46. In one embodiment, the vapor or hydration source may be a vapor-donating fluid or liquid that is loosely or freely disposed within the hydration compartment 46. In another embodiment, which is illustrated in Fig. 2, the hydration compartment 46 includes a liquid-absorbent wicking member or liquid-sequestering element 50, which absorbs or sequesters a vapor-donating liquid. If provided, the wicking member 50 may be manufactured from any suitable liquid-absorbent material, such as, for example, a fabric strip, an absorbent paper strip, or an absorbent open-celled foam strip.

When a wicking member 50 is positioned within the hydration compartment 46, it may be wetted with an aqueous vapor-donating liquid (e.g., water) at a point in time prior to when the interior space 30 is formed by forming the seals 24, 26, and 28 to thereafter produce a water vapor atmosphere within the interior space 30 for activating the hydrophilic coating on the catheter 16. This may be achieved by vapor donated from the liquid in the wicking member 52 passing through the barrier 48 and into the catheter-containing compartment 44, where the vapor contacts and activates the hydrophilic coating of the catheter 16. In this manner, the interior space 30 formed by the package 10 positions the catheter 16 in one compartment 44 and the vapor-donating liquid in a separate compartment 46, such that the catheter 16 is maintained out of direct contact with the liquid, while still being lubricated by the vapor from the liquid.

A liquid-absorbent element or member 52, which may be a second wicking member or liquid-sequestering member, may be positioned in the catheter-containing compartment 44, as best shown in Fig. 2. The liquid-absorbent member 52 may be formed of the same material as the wicking member 50 in the hydration compartment 46 or it may be formed of a different material. In either case, the liquid-absorbent member 52 is preferably provided in an initially dry state when the package 10 is formed and sealed, in contrast to the wicking member 50, which is preferably provided in a pre-wetted state.

In a preferred embodiment, the wicking member 50 and the liquid-absorbent member 52 may be formed of the same liquid-absorbent fabric material. If the liquid-absorbent member 52 is provided as a fabric material, it may be variously configured without departing from the scope of the present disclosure. For example, suitable fabric materials may include (without limitation): polyester, polypropylene, viscose and polyethylene terephthalate, polyamide, hemp, cotton, polyacrylate and cellulose wood pulp, bamboo, sodium polyacrylate, PF23100 PBT microfiber meltblown fabric; Stratex 4.5NPET-EE/EE fabric (having an absorbency capacity of water of approximately 0.826 g/in²) from DelStar Technologies, Inc. of Middletown, Delaware; 40 CPH fabric (0.937 g/in²) from Fiberweb of London, England; 50SRV fabric (1.006 g/in²) from Fiberweb; 55CPH fabric (1.209 g/in²) from Fiberweb; 85HPP fabric (2.004 g/in²) from Fiberweb; 38 J fabric (0.566 g/in²) from Fiberweb; Tricel 45 Phil fabric (0.363 g/in²) from Fiberweb; 55CPH Thin fabric (0.841 g/in²) from Fiberweb; Lamitex 90 white fabric (0.536 g/in²) from Fiberweb; SORB-225158-SAS fabric or BGP-02.00G-DSAS fabric from Baltimore Innovations Ltd. of Buckinghamshire, England; Airtex 42MFU fabric from Fiberweb; Airtex 50MFU fabric from Fiberweb; Airtex 70J fabric (0.999 g/in²) from Fiberweb; Felix Plastics fabric (0.556 g/in²); and X550 fabric (0.936 g/in²) from DelStar. In one exemplary embodiment, the liquid-absorbent member 52 is formed of a material having an absorption capacity of water in the range between approximately 0.4 g/in² and approximately 10.0 g/in², but it is within the scope of the present disclosure for the liquid-absorbent member 52 to be formed of a material having an absorption capacity of water outside of that range in other embodiments. The liquid-absorbent member 52 may be manufactured according to any suitable methods, for example with the liquid-absorbent member 52 being (without limitation) a nonwoven or spunlaced or electrospun or woven or melt-blown material.

By providing a liquid-absorbent member 52 in the catheter-containing compartment 44, the formation of condensation in the compartment 44 is reduced or eliminated. More particularly, when a wicking member 50 is provided in the hydration compartment 46, the surface area of the vapor-donating liquid in contact with air is increased, thereby also increasing the rate of evaporation. This is beneficial in quickly increasing the relative humidity in the hydration compartment

46 to saturation when the package 10 is stored at room temperature after sterilization. Due to the high moisture vapor transmission ratio of the barrier 48 (which may be formed of a calcium carbonate material, in one embodiment), a heightened relative humidity may also be quickly achieved in the catheter-containing compartment 44. In a confined environment, such as within the interior space 30 of the package 10, water is constantly evaporating and condensing, and the growth and decay of water droplets depends on which process is dominant. At 100% relative humidity, the dew point of water is reached in the catheter-containing compartment 44 of the package 10, which creates an environment where condensation has the chance to dominate over evaporation, which may result in limited condensation forming in the catheter-containing compartment 44. As vapor condenses in the catheter-containing compartment 44, the process of water vapor transport from the hydration compartment 46 to the catheter-containing compartment 44 continues, maintaining 100% relative humidity and resulting in condensation in the catheter-containing compartment 44 while the catheter assembly 12 is being stored (which may be on the order of several weeks or months or years). The humidity levels in the catheter-containing compartment 44 are continually replenished by the humidity levels in the hydration compartment 46, because it is easier and quicker for water to evaporate from the wet wicking member 50 and cross the barrier 48 than it is for condensed loose water in the catheter-containing compartment 44 to evaporate.

Given the above-described evaporation-hydration conditions, the liquid-absorbent member 52 may perform a number of functions. For example, the liquid-absorbent member 52 in the catheter-containing compartment 44 may act to bind any condensation that does form in the compartment 44. The surface area of the condensation in the catheter-containing compartment 44 is greatly increased upon binding to the liquid-absorbent member 52, thereby correcting the balance between evaporation and condensation and limiting the transport of further excess water from the hydration compartment 46 into the catheter-containing compartment 44. By correcting the balance between evaporation and condensation, the formation of condensation in the catheter-containing compartment 44 is limited, particularly when the catheter assembly 10 is stored for several months or years prior to use.

The liquid-absorbent member in the catheter-containing compartment 44 may be variously configured without departing from the scope of the present disclosure. Several exemplary configurations are illustrated in Figs. 1-14, but it should be understood that the liquid-absorbent member in the catheter-containing compartment 44 may be otherwise configured. In the embodiment of Figs. 1 and 2, the liquid-absorbent member 52 is a single, elongated element disposed on the inner surface of the sheet material 14 within the catheter-containing compartment 44, which extends in generally parallel relation to the catheter 16 in a longitudinal direction. The elongated liquid-absorbent member 52 is preferably at least as long as the portion of the catheter 16 to which the hydrophilic coating is applied, but may be longer or shorter than such portion of the catheter 16. Condensation in the catheter-containing compartment 44 may distribute itself evenly along the length of the liquid-absorbent member 52, so as to provide an elongated liquid-absorbent member 52 that helps avoid localized variations in relative humidity along the length of the package 10 that may affect catheter hydration.

In the embodiment of Figs. 3 and 4, a pair of elongated liquid-absorbent members 52a and 52b are disposed within the catheter-containing compartment 44, secured to the sheet material 14 and on opposing lateral sides of the catheter 16. In the illustrated embodiment, the liquid-absorbent members 52a and 52b are substantially identical and are configured generally according to the foregoing description of the liquid-absorbent member 52 of Figs. 1 and 2. The liquid-absorbent members 52a and 52b are shown as being substantially parallel to each other and the catheter 16, but it is within the scope of the present disclosure for the liquid-absorbent members 52a and 52b to be differently configured and/or to be non-parallel to each other and/or the catheter 16. Additionally, the two liquid-absorbent members 52a and 52b may be placed on the same lateral side of the catheter 16, rather than being positioned on opposing lateral sides, or one of the liquid-absorbent members may be positioned against or secured to the barrier 48. Furthermore, it is also within the scope of the present disclosure for more than two elongated liquid-absorbent members to be positioned within the catheter-containing compartment 44.

In the embodiment of Figs. 5 and 6, a single line or column of liquid-absorbent members 52c, 52d, and 52e may be disposed within the catheter-

containing compartment 44, secured to the sheet material 14. The line of liquid-absorbent members (which is shown in Fig. 5 as including three separate liquid-absorbent members 52c, 52d, and 52e, but may include two liquid-absorbent members or more than three liquid-absorbent members) extends substantially
5 along the length of the interior space 30 of the package 10, as in the embodiments of Figs. 1-4, but the individual liquid-absorbent members 52c, 52d, and 52e are relatively short, rather than being elongated. The line or column of liquid-absorbent members 52c, 52d, and 52e is preferably at least as long as the portion
10 of the catheter 16 to which the hydrophilic coating is applied, but may be longer or shorter than such portion of the catheter 16. In the illustrated embodiment, the liquid-absorbent members 52c, 52d, and 52e are substantially identical and aligned in a single line or column that is substantially parallel to the catheter 16, but it is within the scope of the present disclosure for the liquid-absorbent members 52c, 52d, and 52e to be differently configured and/or to be positioned
15 out of alignment with each other and/or the catheter 16.

The embodiment of Figs. 7 and 8 is similar to the embodiment of Figs. 5 and 6, but provides a second line or column of liquid-absorbent members 52f, 52g, and 52h within the catheter-containing compartment 44, positioned against or secured to the sheet material 14. The two lines or columns of liquid-absorbent
20 members are shown as being substantially parallel to each other and the catheter 16, but it is within the scope of the present disclosure for the lines or columns to be differently configured and/or to be non-parallel to each other and/or the catheter 16. Additionally, the two lines or columns of liquid-absorbent members may be placed on the same lateral side of the catheter 16, rather than being
25 positioned on opposing lateral sides, or one of the lines or columns of liquid-absorbent members may be positioned against or secured to the barrier 48. Furthermore, it is also within the scope of the present disclosure for more than two lines or columns of liquid-absorbent members to be positioned within the catheter-containing compartment 44.

30 The embodiment of Figs. 9 and 10 is similar to the embodiment of Figs. 1 and 2, but positions or secures a single, elongated liquid-absorbent member 52i against the barrier 48, rather than against the inner surface of the sheet material 14. In the illustrated embodiment, the liquid-absorbent member 52i is wider than

the liquid-absorbent member 52 of Figs. 1 and 2 (compare Figs. 2 and 10), but it is within the scope of the present disclosure for the liquid-absorbent member 52 of Figs. 1 and 2 to have a greater width or for the liquid-absorbent member 52i of Figs. 9 and 10 to have a lesser width than what is illustrated.

5 In the embodiment of Figs. 11 and 12, a pair of liquid-absorbent members 52j and 52k are disposed within the catheter-containing compartment 44, secured to the barrier 48 and on opposing lateral sides of the catheter 16. In the illustrated embodiment, the liquid-absorbent members 52j and 52k are substantially identical and substantially parallel to each other and the catheter 16, but it is within the
10 scope of the present disclosure for the liquid-absorbent members 52j and 52k to be differently configured and/or to be non-parallel to each other and/or the catheter 16. Additionally, the two liquid-absorbent members 52j and 52k may be placed on the same lateral side of the catheter 16, rather than being positioned on opposing lateral sides. Furthermore, it is also within the scope of the present
15 disclosure for more than two elongated liquid-absorbent members to be positioned within the catheter-containing compartment 44.

As best shown in Fig. 11, each liquid-absorbent member 52j, 52k has a length approximately equal to the length of the catheter 16 between a proximal fixture or element 54 (such as an insertion aid or introducer) and a distal fixture or
20 element 56 (such as a funnel for draining urine into a disposal container). This intermediate section of the catheter 16 is the portion thereof which preferably includes the hydrophilic coating, such that the lengths of the liquid-absorbent members 52j and 52k are approximately equal to the length of the hydrophilic coating. In other embodiments, the liquid-absorbent members 52j and 52k may
25 be longer or shorter than the length of the hydrophilic coating on the catheter 16 without departing from the scope of the present disclosure.

In the embodiment of Figs. 13 and 14, two separate liquid-absorbent members 52m and 52n may be provided in the catheter-containing compartment 44, positioned against or secured to the barrier 48. In the illustrated embodiment,
30 the liquid-absorbent members 52m and 52n are substantially identical squares or rectangles, with one being positioned generally proximally or above the catheter 16 (e.g., adjacent to the proximal end seal 24 of the package 10) and the other positioned generally distally or below the catheter 16 (e.g., adjacent to the distal

end seal 26). It is within the scope of the present disclosure for the liquid-absorbent members 52m and 52n to be differently configured and/or for one or both of them to be positioned against or secured to the sheet material 14.

Any of a number of variations may be made to the liquid-absorbent member(s) in the catheter-containing compartment 44 without departing from the scope of the present disclosure. For example, a liquid-absorbent member may have a varying width and/or thickness along its length. If more than one liquid-absorbent member is provided within the catheter-containing compartment 44, the liquid-absorbent members may be formed of different materials and/or materials having different liquid-sequestration properties. Further, it is also within the scope of the present disclosure for the catheter-containing compartment 44 to include one or more liquid-absorbent members positioned against or secured to the sheet material 14 and one or more liquid-absorbent members positioned against or secured to the barrier 48. Additionally, the liquid-absorbent members illustrated in the varying embodiments may be used together, such as an embodiment in which a single elongated liquid-absorbent member is positioned against or secured to the sheet material 14 in the catheter-containing compartment 44 (as illustrated in Figs. 1 and 2) and a plurality of smaller liquid-absorbent members are positioned against or secured to the barrier 48 (as illustrated in Figs. 13 and 14). Other variations and combinations may also be employed without departing from the scope of the present disclosure.

It should be understood that the methods described herein are merely exemplary, and that the steps described above may be carried out in a different order. Further, other steps may be included when using the devices described herein. Additionally, one or more of the steps described herein in connection with the methods may be omitted or modified without departing from the scope of the present disclosure. Similarly, the systems described herein are merely exemplary, and they may be differently configured (e.g., by combining one or more components of one described embodiment with one or more components of another described embodiment) without departing from the scope of the present disclosure.

Aspects of the present subject matter described above may be beneficial alone or in combination with one or more other aspects. Without limiting the

foregoing description, in accordance with one aspect of the subject matter herein, there is provided a catheter assembly, which includes a catheter and a catheter package. At least a portion of the catheter includes a coating which produces a low-friction surface on the catheter when treated with an activating substance.

5 The catheter package defines an interior space divided into a catheter-containing compartment and a hydration compartment by a gas-permeable, liquid-impermeable barrier. A vapor-donating liquid is positioned within the hydration compartment and a liquid-absorbent member is positioned within the catheter-containing compartment.

10 In accordance with another aspect which may be used or combined with the first aspect, the liquid-absorbent member is secured to an inner surface of the catheter package.

In accordance with another aspect which may be used or combined with the first aspect, the liquid-absorbent member is secured to the barrier.

15 In accordance with another aspect which may be used or combined with the any of the preceding aspects, a wicking member is positioned within the hydration compartment.

In accordance with another aspect which may be used or combined with the fourth aspect, the liquid-absorbent member and the wicking member are
20 formed of the same material.

In accordance with another aspect which may be used or combined with the fourth aspect, the liquid-absorbent member and the wicking member are formed of different materials.

25 In accordance with another aspect which may be used or combined with any of the preceding aspects, the absorption capacity of water of the liquid-absorbent member is in the range between approximately 0.4 g/in² and approximately 10.0 g/in².

30 In accordance with another aspect which may be used or combined with any of the preceding aspects, the length of the liquid-absorbent member is at least as great as the length of said at least a portion of the catheter which includes the coating.

In accordance with another aspect which may be used or combined with any of the preceding aspects, a second liquid-absorbent member is positioned

within the catheter-containing compartment.

In accordance with another aspect which may be used or combined with the preceding aspect, the liquid-absorbent members are substantially identical.

5 In accordance with another aspect which may be used or combined with the ninth aspect, the liquid-absorbent members are differently configured.

In accordance with another aspect which may be used or combined with any of the preceding three aspects, the liquid-absorbent members are positioned on opposite lateral sides of the catheter.

10 In accordance with another aspect which may be used or combined with any of the ninth through eleventh aspects, the liquid-absorbent members are positioned on the same lateral side of the catheter.

In accordance with another aspect which may be used or combined with any of the ninth through eleventh aspects, the liquid-absorbent members are positioned on opposite proximal and distal sides of the catheter.

15 In accordance with another aspect which may be used or combined with any of the first through eighth aspects, a plurality of liquid-absorbent members are positioned within the catheter-containing compartment on one lateral side of the catheter and a plurality of liquid-absorbent members are positioned within the catheter-containing compartment on an opposite lateral side of the catheter.

20 It will be understood that the embodiments described above are illustrative of some of the applications of the principles of the present subject matter. Numerous modifications may be made by those skilled in the art without departing from the spirit and scope of the claimed subject matter, including those combinations of features that are individually disclosed or claimed herein. For
25 these reasons, the scope hereof is not limited to the above description but is as set forth in the following claims, and it is understood that claims may be directed to the features hereof, including as combinations of features that are individually disclosed or claimed herein.

CLAIMS

1. A catheter assembly, comprising:
a catheter package defining an interior space divided into a catheter-
containing compartment and a hydration compartment by a gas-permeable, liquid-
5 impermeable barrier;
a catheter positioned within the catheter-containing compartment, wherein
at least a portion of the catheter includes a coating which produces a low-friction
surface on the catheter when treated with an activating substance;
a vapor-donating liquid positioned within the hydration compartment; and
10 a liquid-absorbent member positioned within the catheter-containing
compartment.
2. The catheter assembly of claim 1, wherein the liquid-absorbent member is
secured to an inner surface of the catheter package.
- 15 3. The catheter assembly of claim 1, wherein the liquid-absorbent member is
secured to the barrier.
4. The catheter assembly of any of the preceding claims, further comprising a
20 wicking member positioned within the hydration compartment.
5. The catheter assembly of claim 4, wherein the liquid-absorbent member
and the wicking member are formed of the same material.
- 25 6. The catheter assembly of claim 4, wherein the liquid-absorbent member
and the wicking member are formed of different materials.
7. The catheter assembly of any of the preceding claims, wherein the
absorption capacity of water of the liquid-absorbent member is in the range
30 between approximately 0.4 g/in² and approximately 10.0 g/in².
8. The catheter assembly of any of the preceding claims, wherein the length
of the liquid-absorbent member is at least as great as the length of said at least a

portion of the catheter which includes the coating.

9. The catheter assembly of any of the preceding claims, further comprising a second liquid-absorbent member positioned within the catheter-containing
5 compartment.

10. The catheter assembly of claim 9, wherein the liquid-absorbent members are substantially identical.

10 11. The catheter assembly of claim 9, wherein the liquid-absorbent members are differently configured.

12. The catheter assembly of any of claims 9-11, wherein the liquid-absorbent members are positioned on opposite lateral sides of the catheter.

15

13. The catheter assembly of any of claims 9-11, wherein the liquid-absorbent members are positioned on the same lateral side of the catheter.

14. The catheter assembly of any of claims 9-11, wherein the liquid-absorbent
20 members are positioned on opposite proximal and distal sides of the catheter.

15. The catheter assembly of any of claims 1-8, further comprising a plurality of liquid-absorbent members positioned within the catheter-containing compartment on one lateral side of the catheter and a plurality of liquid-absorbent members
25 positioned within the catheter-containing compartment on an opposite lateral side of the catheter.

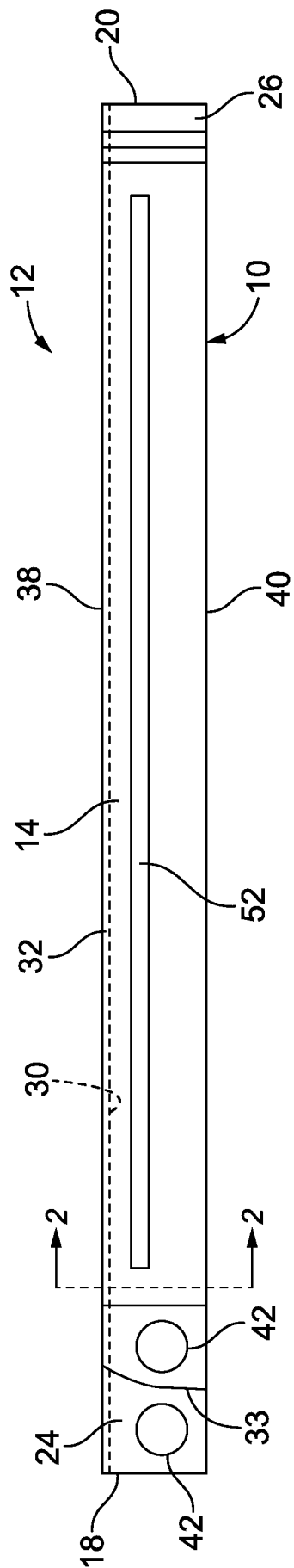


FIG. 1

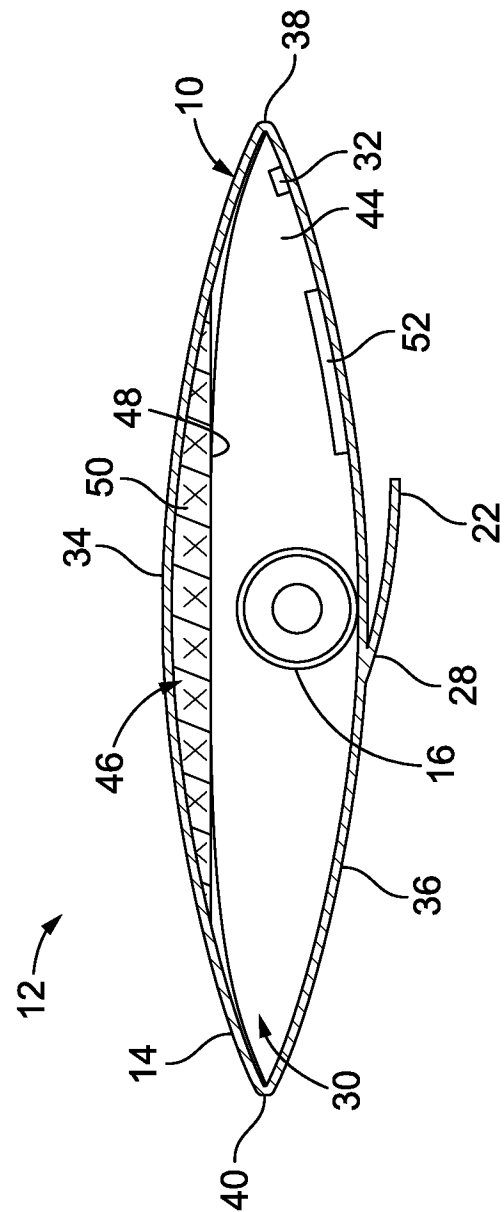


FIG. 2

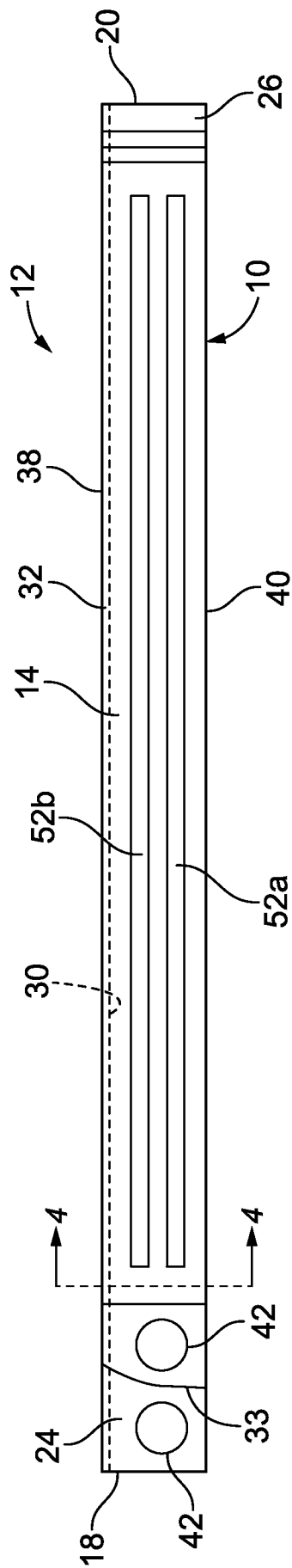


FIG. 3

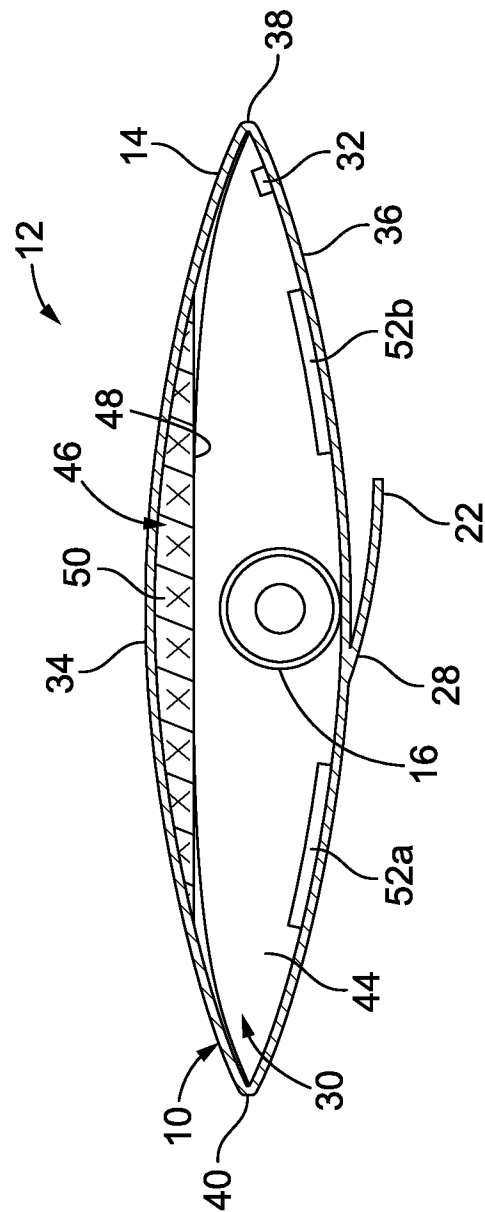


FIG. 4

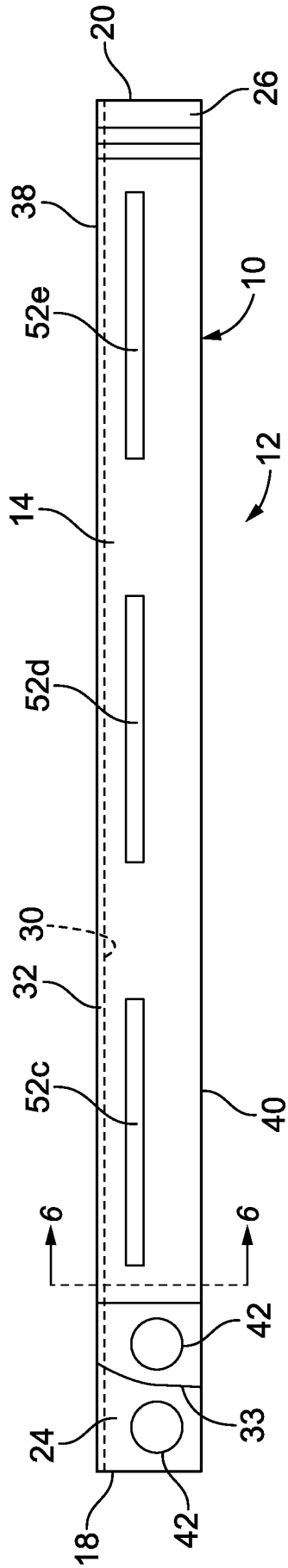


FIG. 5

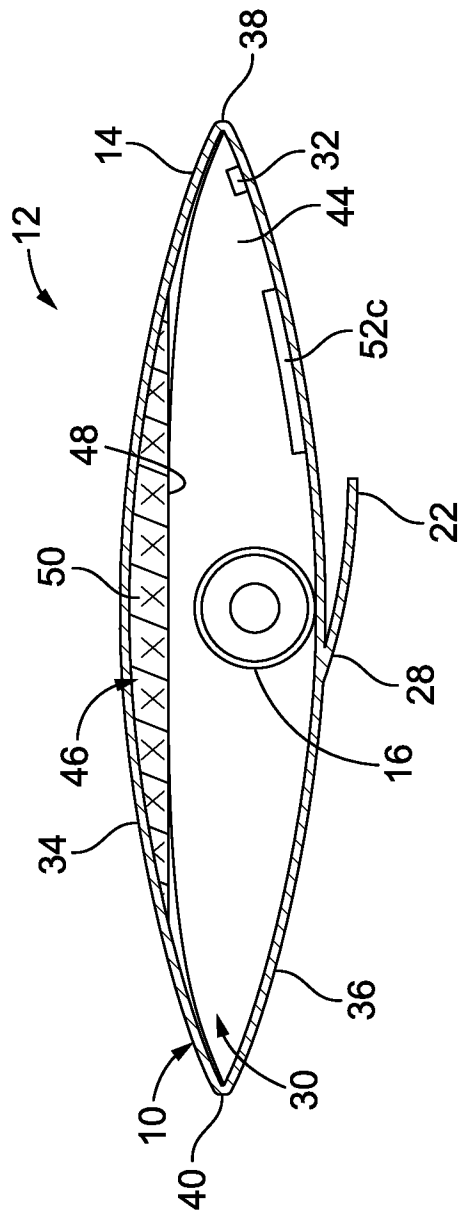


FIG. 6

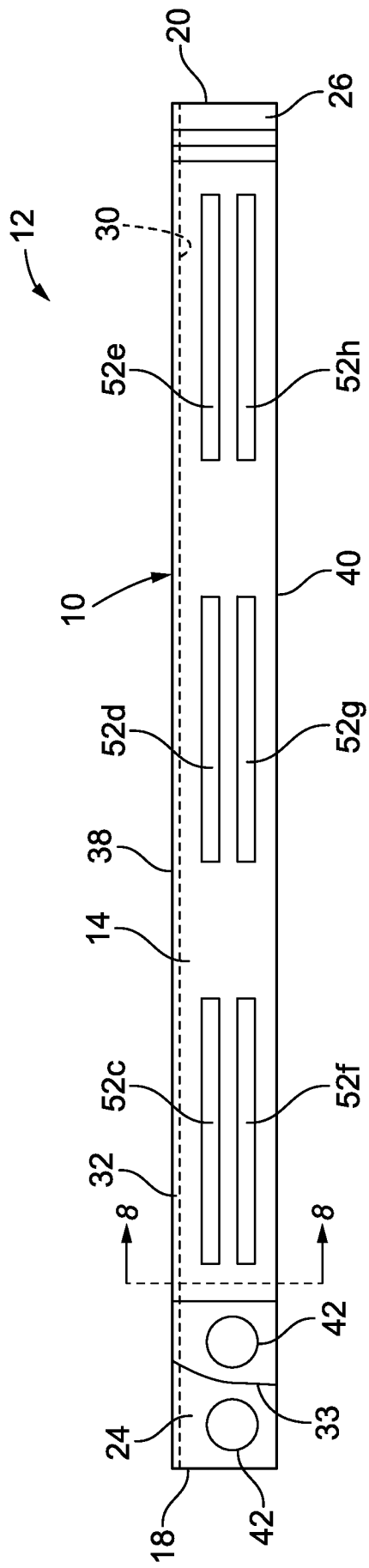


FIG. 7

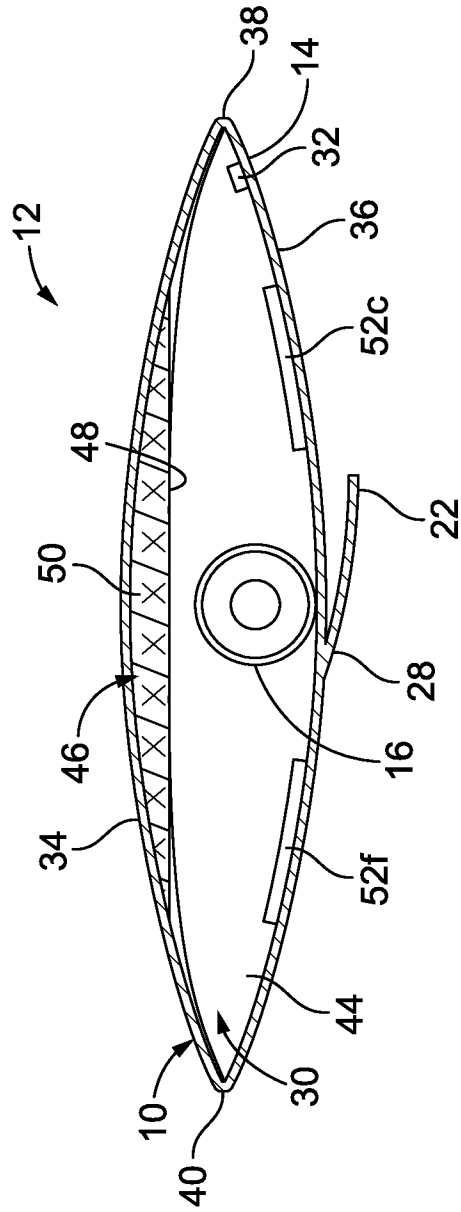


FIG. 8

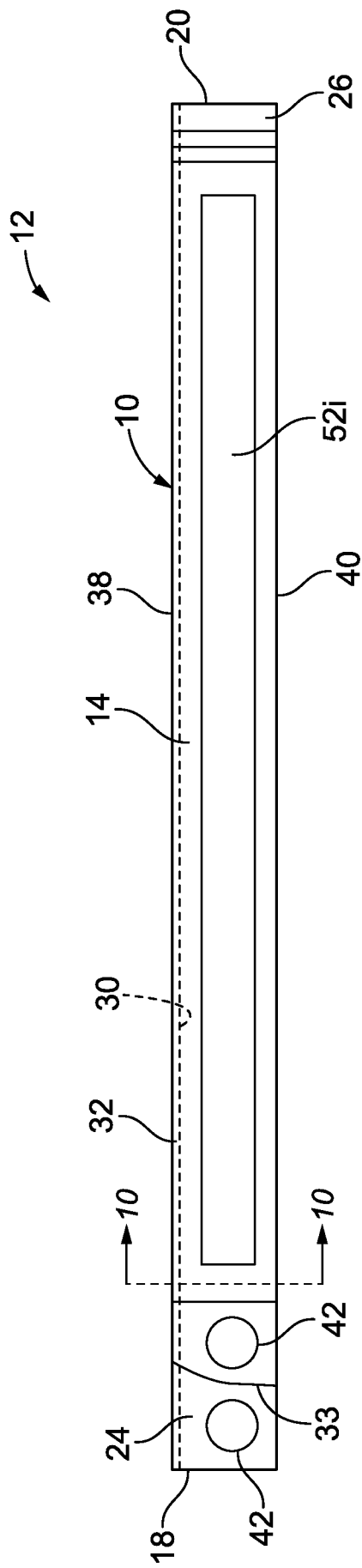


FIG. 9

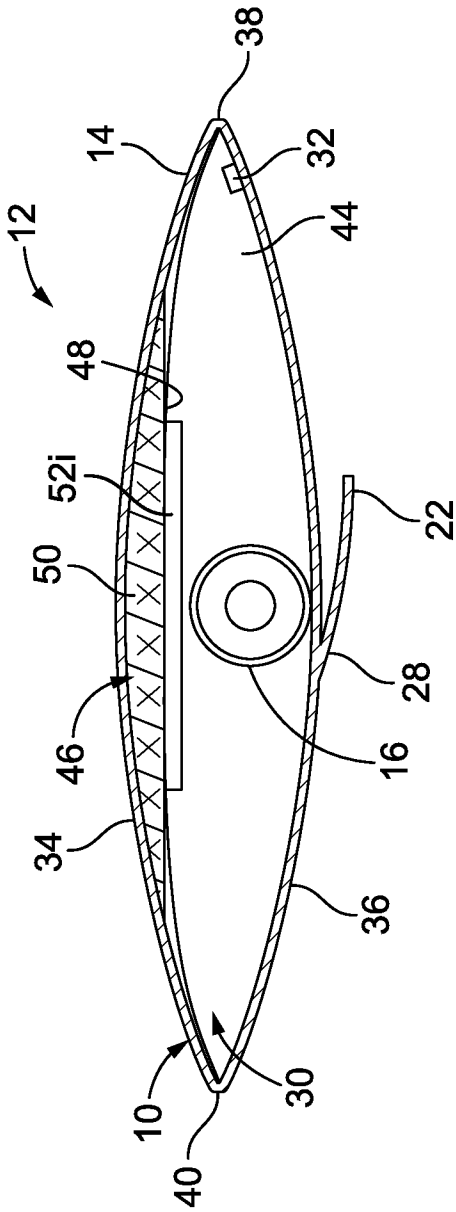


FIG. 10

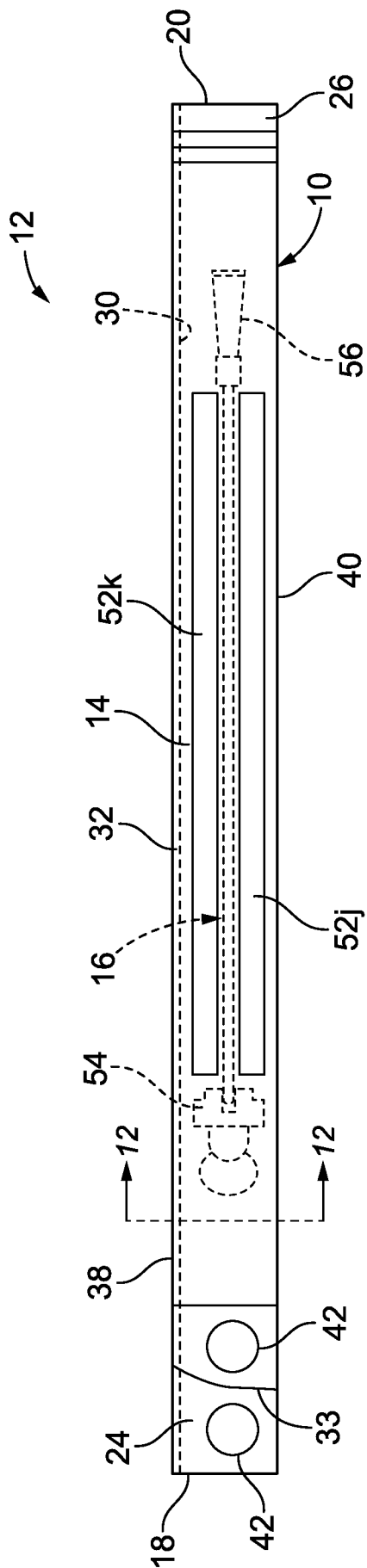


FIG. 11

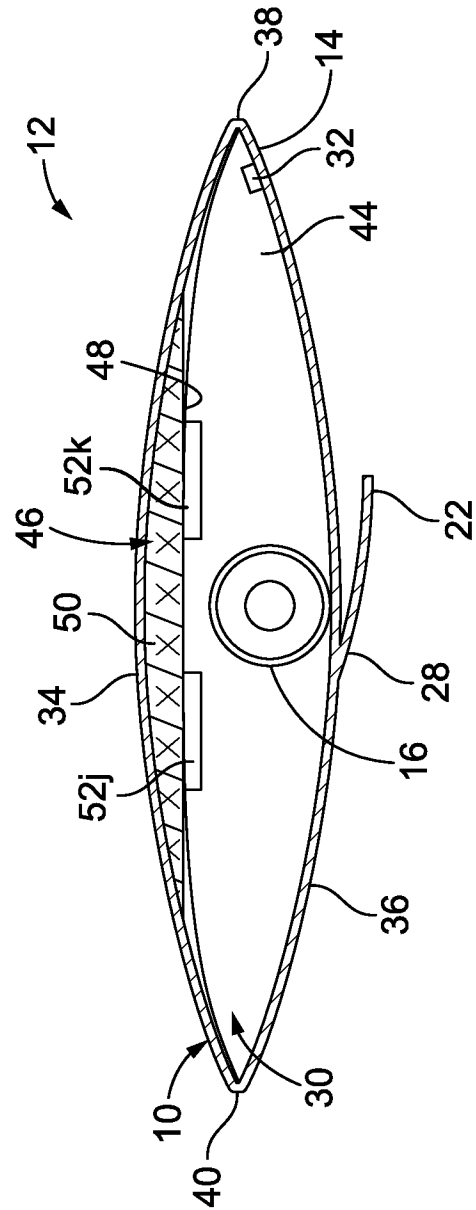


FIG. 12

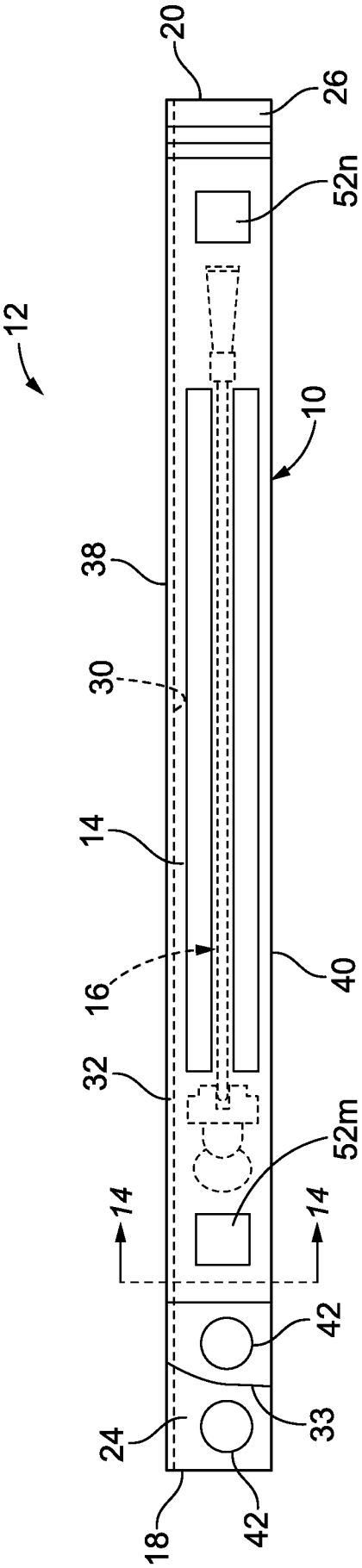


FIG. 13

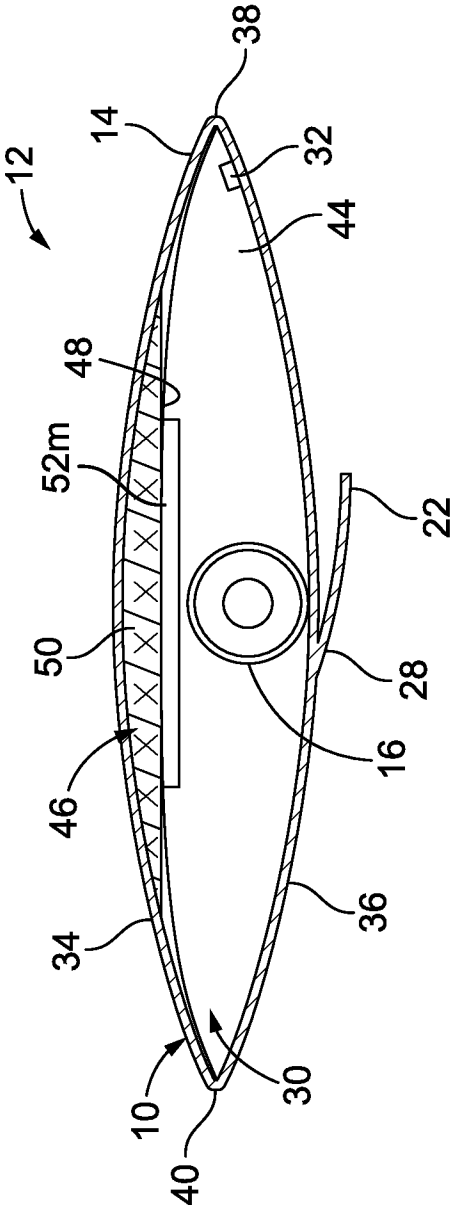


FIG. 14

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/060895

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61M25/00 B65D81/32
ADD.

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)

A61M B65D A61B

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2001 130634 A (TERUMO CORP) 15 May 2001 (2001-05-15)	1-3, 7-15
Y	paragraph [0019] - paragraph [0020] paragraph [0026] paragraph [0031] - paragraph [0033] paragraph [0052] - paragraph [0054] paragraph [0064]	4-6
Y	----- US 2013/146599 A1 (MURRAY MICHAEL [IE] ET AL) 13 June 2013 (2013-06-13) paragraph [0072]	4-6
A	----- EP 2 060 296 A1 (HOLLISTER INC [US]) 20 May 2009 (2009-05-20) cited in the application figures 7-11 paragraph [0058] - paragraph [0059] ----- -/-	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search

13 February 2015

Date of mailing of the international search report

23/02/2015

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Authorized officer

Przykutta, Andreas

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/060895

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

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