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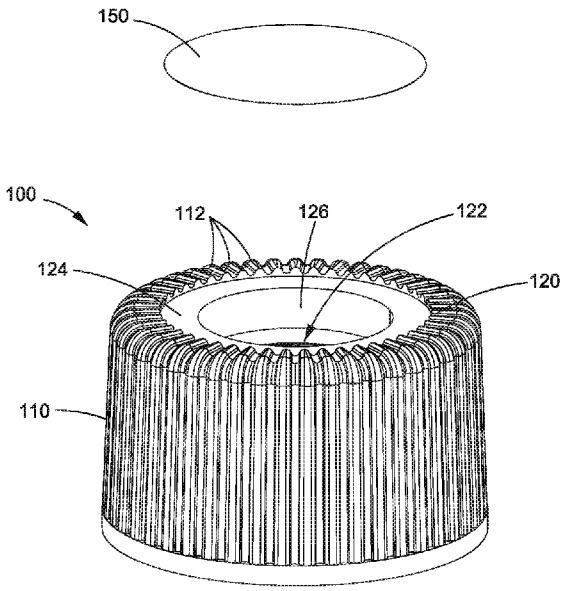

FIG. 1

(57) Abstract: Embodiments are directed to a removable cap with a conduction seal closure for sealing an opening of a container. The cap has a side wall and a top wall with an open access hole there-through. A flat upper portion surrounds the open access hole, which is sealed by the conduction seal. The conduction seal comprises a first polymer sealing layer, an aluminum foil layer on top of the first layer to heat seal the first layer to the cap, and a second polymer layer arranged on top of the aluminum foil layer for protection. The aluminum foil provides a formable shaping strength such that upon seal piercing, a permanent memory spread of the first and third layers is achieved. Removal of the cap does not damage the seal. Access to the container contents is achieved without probe contact to the as-pierced seal.

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REMOVABLE CAP WITH SEAL DESIGNED TO BE OPENED BY PIERCING IN A DIAGNOSTIC ANALYZER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. provisional application Serial No. 62/357,912 filed July 1, 2016, the contents of which is incorporated herein by reference in its entirety.

TECHNOLOGY FIELD

[0002] The present invention relates generally to a cap and seal for a container in use in a diagnostic analyzer, and more particularly to container with a removable cap with a conductively bonded seal to conceal a mouth of a reagent container used in a diagnostic analyzer.

BACKGROUND

[0003] Caps, in particular injection-molded screw caps, are commonly used for sealing containers, such as bottles. A primary function of caps is to keep a container closed and leak-free until contents of the container are to be used.

[0004] Screw caps are known to operate acceptably when installed on containers that are sealed by an induction-sealed membrane. A claw-seal projection inside of such caps may be used to apply pressure to a specific top contact area or inside of a top throat surface of the container. Such cap and container assemblies may include an external sleeve surrounding the cap and container interface. The sleeve may prevent leakage and provide a visual indication of prior access to the container contents.

[0005] Other designs incorporate a seal membrane that includes an aluminum foil layer between two polymeric layers. A bottom polymer layer is sealed to an opening of the container by inductive heating of the aluminum foil layer, thereby melting and bonding the

bottom polymer layer to the container. The seal serves to protect the contents of the container and form a leak-proof closure of the container. Access to the container contents is performed by removal of the cap and manual peeling or perforation of the induction-sealed membrane. However, when used in an automatic process that requires a high throughput, such as a diagnostic analyzer, manual removal of the cap and peeling/perforation of the membrane is undesirable due to the amount of required operator-incurred time and the opportunity for introducing cross-contaminants.

[0006] Thus, there is a need for providing access to contents of a container in an automated manner in a diagnostic analyzer, while reducing possibilities for cross-contamination and spillage.

SUMMARY

[0007] Embodiments are directed to a removable cap with a conduction seal closure for sealing an opening of a container.

[0008] In an embodiment, an apparatus to cover a reagent container used in a diagnostic analyzer in an in vitro diagnostics (IVD) environment comprises: a cap comprising a sidewall, a top wall with an open access hole on and through the top wall, and a flat upper portion surrounding the open access hole, the cap configured to be attached to a throat of the reagent container, the throat comprising an opening; and a conduction seal for sealing the open access hole of the cap. The conduction seal comprises: a first polymer sealing layer configured to be heat-sealed to the flat upper portion of the cap; an aluminum foil layer arranged on top of the first polymer sealing layer and configured to heat seal the first polymer sealing layer by conductive heating to the flat upper portion of the cap; and a second polymer layer arranged on top of the aluminum foil layer and configured to protect the aluminum foil layer and the first polymer layer. The conduction seal is configured to be opened by a perforation device and hold an opened shape when perforated, while remaining adhered to the

flat upper portion of the cap, to provide access to contents of the container via the opened shape, the open access hole of the cap, and the throat opening of the container.

[0009] According to another embodiment, an apparatus for storing one or more fluids in a diagnostic analyzer in an in vitro diagnostics (IVD) environment comprises: a container comprising one or more storage portions, each storage portion comprising a throat with a throat sidewall, an opening, and an outer surface of the opening; one or more caps, each of the one or more caps corresponding to a respective one of the one or more storage portions, each cap comprising a sidewall, a top wall with an open access hole on and through the top wall, and a flat upper portion surrounding the open access hole, the cap configured to be attached to the throat of the storage portion of the container; and one or more conduction seals, each of the one or more conduction seals corresponding to a respective one of the one or more caps, for sealing the open access hole of the cap. Each conduction seal comprises: a first polymer sealing layer configured to be heat-sealed to flat upper portion of the cap; an aluminum foil layer arranged on top of the first polymer sealing layer and configured to heat seal the first polymer sealing layer by conductive heating to the flat upper portion of the cap; and a second polymer layer arranged on top of the aluminum foil layer and configured to protect the aluminum foil layer and the first polymer layer. The conduction seal is configured to be opened by a perforation device and hold an opened shape when perforated, while remaining adhered to the flat upper portion of the cap, to provide access to contents of the container via the opened shape, the open access hole of the cap, and the throat opening of the storage portion of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The foregoing and other aspects of the present invention are best understood from the following detailed description when read in connection with the accompanying drawings. For the purpose of illustrating the invention, there is shown in the drawings

embodiments that are presently preferred, it being understood, however, that the invention is not limited to the specific instrumentalities disclosed. Included in the drawings are the following Figures:

[0011] FIG. 1 is a diagram depicting a view of a cap and a seal, according to an embodiment;

[0012] FIG. 2 is a diagram depicting aspects of a cap, according to an embodiment;

[0013] FIG. 3 is a diagram illustrating aspects of a multi-layer seal, according to an embodiment;

[0014] FIG. 4 is a diagram of an exemplary container, according to an embodiment;

[0015] FIG. 5 illustrates an exemplary container to which caps with seals are attached, according to an embodiment;

[0016] FIG. 6 illustrates an exemplary container to which caps with seals are attached, with the seals punctured, according to an embodiment; and

[0017] FIG. 7 is a layout of an example system architecture within which embodiments of the invention may be used, according to an embodiment.

DETAILED DESCRIPTION

[0018] Embodiments are directed to a removable cap with a conduction seal closure for sealing an opening of a container. Advantageously, according to embodiments provided herein, the cap with the seal does not need to be removed for a probe to access contents of the container, when used in a diagnostic analyzer, thereby eliminating operator steps of cap removal and/or seal peeling or perforation. However, the cap with the seal can be removed without compromising the integrity of the seal.

[0019] According to embodiments, automated opening of the cap and seal combination is provided by puncturing the seal without removal of the cap and seal from the container. The seal advantageously retains its opened shape required for unobstructed, non-

contact probe access to contents of the container. Cross-contamination and level sense problems are addressed by prevention of unintended probe contact with surfaces other than the container's contents.

[0020] Although embodiments are described with respect to a reagent container for use in a diagnostic or clinical analyzer, the invention is not so limited. The cap and the seal provided herein may be used in any type of environment in which it is desired to open a seal on a container for access to contents contained in the container.

[0021] With reference to FIG. 1 and 2, features of a cap 100 are illustrated, according to an embodiment. FIG. 1 also includes illustration of a seal 150, according to an embodiment. FIG. 1 is a perspective view of the cap 100 and the seal 150, and FIG. 2 provides an underside perspective view of the cap 100.

[0022] The cap 100 is comprised of a sidewall 110 and a top wall 120. The sidewall 110 and the top wall 120 define an interior portion 130 (see FIG. 2) of the cap 100.

[0023] The sidewall 110 and a portion of the top wall 120 may, as shown in the embodiment of FIGs. 1 and 2, have a series of ridges 112 on its outer surface to aid in gripping the cap 100. The cap 100 is not limited to this configuration, and the sidewall 110 and/or the top wall 120 may instead have a smooth outer surface or other surface texture.

[0024] With continued reference to FIGs. 1 and 2, an open access hole 122 is formed in and through the top wall 120 of the cap 100. In an embodiment, the open access hole 122 is a center hole in the top wall 120. A portion of the top wall 120 surrounding the open access hole 122 is comprised of an upper flat portion 124 (see FIG. 1), a hole sidewall 126 (see FIGs. 1 and 2), and a claw-type seal 128 (see FIG. 2). In an embodiment, as shown in FIG. 1, the upper flat portion 124 is a recessed portion with respect to a surrounding area of the top wall 120.

[0025] As shown in FIG. 2, an internal sidewall 140 of the cap 100 may include threads 142 and/or one or more tabs or 144 for connection of the cap 100 to a container, as described below. The cap 100 is not limited to such a configuration of the internal sidewall 140, and other designs may instead be utilized, such as, for example, an internal sidewall 140 with components for snap-fitting the cap 100 onto a container.

[0026] In an embodiment, the cap 100 is formed of polypropylene, such as a high-density polypropylene, or other polymeric material, although the cap 100 is not so limited. In an embodiment, the upper flat portion 124 of the cap 100 is formed of polypropylene, while a remaining portion of the cap 100 may be formed of another material.

[0027] As shown in FIG. 1, the seal 150 is of a generally circular shape. The circular shape of the seal 150 is sized to fit within the upper flat portion 124 of the cap 100 to conceal the open access hole 122 of the cap 100. The open access hole 122 and the seal 150 are not limited to a circular shape, and other shapes may be utilized. The seal 150 is sized, according to an embodiment, to conceal the open access hole 122 and a majority (i.e., greater than 50%) portion of the upper flat portion 124 of the cap 100. In an embodiment, the seal 150 is sized to conceal substantially all of the upper flat portion 124 of the cap 100, when sealed thereto, according to embodiments described herein.

[0028] FIG. 3 is a diagram illustrating additional aspects of the seal 150, according to an embodiment. The seal 150, according to an embodiment, is comprised of three layers: a first (bottom) polymer sealing layer 160 comprising a heat-sealable polymer capable of being heat-sealed to the upper flat portion 124 of the cap 100; an aluminum foil (middle) layer 170 arranged on top of the first polymer sealing layer 160, comprising aluminum foil to heat seal the first polymer sealing layer 160 by conductive heating of the aluminum; and a second (top) polymer layer 180 arranged on top of the aluminum foil layer 170 configured to protect the aluminum foil layer 170 and the first polymer sealing layer 160.

[0029] In an embodiment, the first polymer sealing layer 160 comprises polypropylene, and the second polymer layer 180 comprises polyethylene terephthalate. In an embodiment, the second polymer layer 180 comprising polyethylene terephthalate forms a laminate with the aluminum foil layer 170.

[0030] According to embodiments herein, the first polymer sealing layer 160 performs a seal adhesion function by application of heat energy (from conduction heating of the aluminum foil layer 170) and contact pressure to result in a molecular bonding of the two matching material compositions of the polypropylene first polymer sealing layer 160 and the polypropylene cap 100.

[0031] According to embodiments herein, the aluminum foil layer 170 performs the following functions: transfer of heat to the polypropylene first polymer sealing layer 160 for molecular thermal seal bonding of the first polymer sealing layer 160 to the upper flat portion 124 of the cap 100; the formable and "memory" shaping characteristics of the aluminum foil layer 170 introduce shape retention capability and thus the ability to "hold open" the first polymer sealing layer 160 and the second polymer layer 180.

[0032] According to an embodiment, the second polymer layer 180 is exposed to the external environment surrounding the cap 100, the seal 150, and the container 200, thus providing a protective layer for the first polymer sealing layer 160 and the aluminum foil layer 170 from degradation related to ambient or external exposure to contamination. As such, the second polymer layer 180 is an ambient, vapor, and water-proof seal.

[0033] FIG. 4 is a diagram of an exemplary container 200 that may be used with the cap 100 with the seal 150. Other types of containers or variations of the container 200 may be used, and the cap 100-seal 150 combination is not limited to use of the exemplary container 200 described herein. Detailed features of an exemplary reagent container are

provided in PCT Patent Application Serial No. PCT/US14/019078, the contents of which are hereby included by reference in their entirety herein.

[0034] According to an embodiment, as shown in FIG. 4, the container 200 is comprised of two storage portions (or packs) 210, 220 configured to hold fluids (e.g., reagent fluids) or other materials (e.g., powders) for a particular on-board diagnostic test on a diagnostic analyzer, for example. A gripping portion 230 may extend between the two storage packs 210, 220 and is, in an embodiment, a substantially flat surface that may have one or more protrusions or gripping portions provided thereon.

[0035] Each storage portion 210, 220 comprises a throat 211, 221, respectively, to which a cap 100 with a seal 150 may be attached, according to embodiments provided herein. The throat 211 comprises an opening 212, a throat sidewall 213, and a top surface 214 of the throat sidewall 213 (i.e., an outer surface of the opening 212). Throat sidewall threads 215 may be formed on the throat sidewall 213 for mating with the threads 142 of the internal sidewall 140 of the cap 100. As noted above, the container 200 and the cap 100 are not limited to the threaded configuration and each may instead have other components or characteristics for mating together the cap 100 and the container 200 (e.g., snap-fit components or the like). The claw-like seal 128 of the cap 100 provides for the cap 100 to act as seal between the top surface of the throat sidewall 213 and the cap 100.

[0036] Similar to the throat 211, the throat 221 comprises an opening 222, a throat sidewall 223, and a top surface 224 of the throat sidewall 223 (i.e., an outer surface of the opening 222). Throat sidewall threads 225 may be formed on the throat sidewall 223 for mating with the threads 142 of the internal sidewall 140 of the cap 100.

[0037] Of course, the container 200 shown in and described herein with reference to FIG. 4 is purely exemplary and non-limiting to the cap 100 with the seal 150 disclosed herein. In an embodiment, a container to be used with the cap 100-seal 150 combination,

according to embodiments provided herein, may have a single storage portion, for example. Moreover, the container 200, or variations thereof, is not required to be used to store reagent fluids for use in a diagnostic analyzer.

[0038] FIG. 5 depicts an exemplary container 200 with caps and seals 100a-150a, 100b-150b attached to the throat sidewalls 213, 223 to cover the openings 212, 222, respectively, according to an embodiment. As shown in FIG. 5, a portion of the flat upper portion 124a, 124b of each cap 100a, 100b, surrounding the respective seal 150, 150b, is shown.

[0039] FIG. 6 illustrates an exemplary container 200 with caps 100a, 100b with punctured seals 155a, 155b attached to the throats 211, 221. As shown in FIG. 6, the punctured seals 155a, 155b (seals 150a, 150b punctured via a puncturing tool) provide access via openings 156a, 156b of the punctured seals 155a, 155b to contents of the container 200. As shown, the openings 212, 222 of the container 200 are accessible (i.e., full open access to the contents of the container 200) via the openings 156a, 156b of the punctured seals 155a, 155b through the open access holes 122a, 122b of the caps 100a, 100b. This access is achieved, according to an embodiment, without probe or instrument contact to the punctured seals 155a, 155b.

[0040] According to an embodiment, the thermal-induced adhesion (i.e., holding) power of the first polymer sealing layer 160 to the cap 100 is greater than that of the peel force between that of the first layer 160 to second layer 170 and the second layer 170 to the third layer 180.

[0041] In an embodiment, a holding power of the first polymer sealing layer 160 is greater than a required shear force to perforate the aluminum foil layer 170 and the second polymer layer 180.

[0042] In an embodiment, a melting temperature of the first polymer sealing layer 160 is higher than a melting temperature of the second polymer layer 180.

[0043] In an embodiment, a counterpart holding power of the first polymer sealing layer 160 to the cap 100 is obtained by combining force direction and heat applied to the seal 150 by the flat upper portion 124 of the cap 100 during the conductive sealing process of the seal 150 to the cap 100.

[0044] In an embodiment, the second polymer layer 180 and the aluminum foil layer 170 have a difference in releasing power compared to the first polymer sealing layer 160 conductively bonded to the upper flat portion 124 of the cap 100, based on the differences in their respective materials.

[0045] According to an embodiment, a cap 100 and a seal 150, upon the cap 100 being connected (e.g., screwed) to a container 200 and the seal 150 placed and centered within the upper flat portion 124 of the cap 100, are exposed to a conductive heat source, according to methods known by those of ordinary skill in the art, in which by heating the aluminum foil layer 170, heat is transferred to melt-able layers (i.e., the first polymer sealing layer 160). Heat conduction is such that the attachment of the first polymer sealing layer 160 is contiguous and without void so that the first layer 160 is molecularly bonded by the co-mingling of material from both surfaces (i.e., the upper flat portion 124 of the cap 100 and an underside of the first polymer sealing layer 160). The application of heat to the aluminum foil layer 170 causes the polymer surface (i.e., the first polymer sealing surface 160) of the seal 150 to melt, resulting in molecular bonding of the first polymer sealing layer 160 to the cap 100. Removal of the cap 100 after heat conduction will not void or compromise the sealed surface of the cap 100, and a sealed closure will remain until it is pierced or punctured by a puncturing device. The piercing of the seal 150 by penetration of an opener tool or puncturing device produces an underside curl-shaping of the seal 150 (i.e., punctured seal

155a, 155b and seal opening 156a, 156b as shown in FIG. 6), which remains open due to the tension of the aluminum foil layer 170 of the seal laminate. The piercing or puncturing of the seal 150 may be done by automation, but may also be accomplished manually with a hand-tool used by an operator.

[0046] According to embodiments provided herein, the cap 100 acts as a seal by way of the claw-seal contact 128 with the top surfaces 214, 224 of the container throat 211, 211. The top cap surface (i.e., the upper flat portion 124) surrounding the open access hole 122 is used for application of the pressure/heat conducted sealing process of the multi-layered seal 150. The center open access hole 122 in the cap 100 is provided for automatic (pierce-type) seal 150 opening to avail automatic or manual access to the contents of the container 200. According to embodiments provided herein, removal of a contiguous sealed cap (100-150) (e.g., for the addition of additives), access to the container 200 contents, and re-closure of the cap 100 is provided. The common materials between the polymer cap 100 and the first polymer sealing layer 160 enables the cap 100 conduction process to adhere the seal 150 to the cap 100. The cap 100 also, via the open access hole 122, confines the sizing of the piercing tool to the center throat area (i.e., the throat 211, 221) of the container 200. This piercing action introduces an opening "shape retention," which results from the ductile aluminum foil layer 170 perforation impinging on the layers 160, 180 and preserving the projection of the aluminum foil layer 170 into the container throat 211, 221. According to embodiments provided herein, ability to access the internal contents of the container 200 by unscrewing and removal of the cap 100 plus seal 150 combination, re-installation of the cap 100 while the external seal 150 remains intact, and auto-opening by piercing of the seal 150 is provided. While, according to embodiments provided herein, it is unnecessary to penetrate the seal 150, once perforation through the seal 150 is carried out, the aluminum foil layer 170 retains the punctured shape of the opening 156 to avail continued access to the contents of the

container 200. The penetration of the seal 150 results in formation and control of the sizing of the access hole 156. Limited only by the size of the open access hole 122, the curled access flanges then become a physical method to retain the opening and prevent probe contact to the seal breakage projections (see FIG. 6). These projections of aluminum maintain the parting of the seal 150 and prevent retraction or re-closure of the seal opening 156, thereby eliminating contact contamination of the probe to aspirations and atomization particulates deposited upon the seal 150. The seal 150 remains attached to the cap 100 even in the event that the cap 100 is subsequently removed. The problem of contact of the access probe to the seal material projections is prevented and the aluminum-polymer seal 150 remains opened and in place on the container 200. Repeated probe access to the container 200, including the emptying of the container 200, is provided without interference of the seal 150 to the accessing probe.

[0047] The combination of the cap 100 with the seal 150 to cover a container 200 and provide access to contents contained therein, as disclosed herein, has several advantages: the cap 100 with the seal 150 protects contents from waste and spillage; operator spills are reduced; incidents of contamination are reduced; ease-of-use and operability are increased. Additionally, instrument errors from probe contact with unintended contamination is prevented, resulting in increased reliability and performance to customers. In a diagnostic analyzer embodiment, in which the container 200 is used for reagents, automated opening and preparation of the container seal 150 for a reagent probe adds value to the instrument performance during reagent probe single or full cycle loading by forming a large access target free of seal obstruction (i.e., the punctured seal opening 156a, 156b). Non-utilization hours observed from probe contact with seal material is eliminated. Customer profits are increased due to the increased reliability of reagent probe access and elimination of current extensive operator time.

[0048] FIG. 7 provides a layout of an example system architecture 700 within which embodiments of the invention may be implemented, according to an embodiment. Shown in FIG. 7 are various transfer arms 710 (710a, 710b, 710c, and 710d) with respective probes; a diluting turntable 720 including a plurality of diluting containers arranged in one or more diluting rings; a reaction turntable 730 including a plurality of reaction containers arranged in one or more reaction rings; and reagent storage areas 740a and 740b dedicated to storage and supply of a respective reagent, each reagent storage area 740a and 740b including space for a plurality of reagent containers 200. In operation, transfer arm 710a and its respective probe may operate to transfer sample from an access position to one or more diluting containers on the diluting turntable 720 to create a dilution therein. Transfer arm 710b and its respective probe may operate to transfer dilution from a diluting container to a reaction container on the reaction turntable 730. Transfer arms 710c and 710d and their respective probes may operate to transfer a reagent from reagent storage area 740a and 740b, respectively, to a reaction container on the reaction turntable 730. The various transfers occur by use of a pumping mechanism (not shown), such as a displacement pump, for example, attached to the transfer arms 710. Additionally, the system architecture 700 includes one or more controllers (not shown) for controlling operation of the various components, including the transfer arms 710, the probes, and the turntables.

[0049] Also included in the system architecture 700 is a reagent handling system 750 for transferring one or more of the containers 200 to and/or from the reagent storage areas 740a and 740b. The reagent handling system 750, according to an embodiment, includes a reagent server module 755, which is, in an embodiment, a refrigerated storage enclosure comprising one or more indexing rings for storing reagent containers 200.

[0050] A tray 760 is configured to hold one or more containers 200 for transfer to and from the reagent server module 755. The tray 760 is accessible to an operator for manual

loading and unloading of containers 200 to and from the tray 760, which may move on a track.

[0051] A gripper assembly 765, in an embodiment, is provided to automatically transfer containers 200 (with caps 100 and seals 150, according to embodiments disclosed herein) between the tray 760 and the reagent server module 755. The gripper assembly 765 moves along a horizontal transfer arm 770 while gripping a container 200 to transfer the container 200. In an embodiment, the gripper assembly 765 includes a pair of gripper fingers that are oriented vertically and opposite one another for gripping a portion of a container 200 and for puncturing or piercing a seal 150 of a cap 100 attached to a container 200 without removal of the cap 100 with the seal 150.

[0052] The system architecture 700 of FIG. 7 and the accompanying description are purely exemplary and non-limiting to the cap 100 and the seal 150 disclosed herein. The system architecture 700 is just one example system in which the cap 100 and the seal 150 may be used.

[0053] Although the present invention has been described with reference to exemplary embodiments, it is not limited thereto. Those skilled in the art will appreciate that numerous changes and modifications may be made to the preferred embodiments of the invention and that such changes and modifications may be made without departing from the true spirit of the invention. It is therefore intended that the appended claims be construed to cover all such equivalent variations as fall within the true spirit and scope of the invention.

CLAIMS

We claim:

1. An apparatus to cover a reagent container used in a diagnostic analyzer in an in vitro diagnostics (IVD) environment, the apparatus comprising:

a cap comprising a sidewall, a top wall with an open access hole on and through the top wall, and a flat upper portion surrounding the open access hole, the cap configured to be attached to a throat of the reagent container, the throat comprising an opening; and

a conduction seal for sealing the open access hole of the cap, the conduction seal comprising:

a first polymer sealing layer configured to be heat-sealed to the flat upper portion of the cap;

an aluminum foil layer arranged on top of the first polymer sealing layer and configured to heat seal the first polymer sealing layer by conductive heating to the flat upper portion of the cap; and

a second polymer layer arranged on top of the aluminum foil layer and configured to protect the aluminum foil layer and the first polymer sealing layer;

wherein the conduction seal is configured to be opened by a perforation device and hold an opened shape when perforated, while remaining adhered to the flat upper portion of the cap, to provide access to contents of the container via the opened shape, the open access hole of the cap, and the throat opening of the container.

2. The apparatus of claim 1, wherein the aluminum foil layer transfers conductive heat to the first polymer sealing layer and the second polymer layer for molecular thermal seal bonding of the first polymer sealing layer to the flat upper portion of the cap; and wherein physical properties of the aluminum foil layer provide for the first polymer sealing layer and the second polymer layer shape to retain the opened shape when perforated.

3. The apparatus of claim 2, wherein the first polymer sealing layer and the cap are comprised of a same material.

4. The apparatus of claim 1, wherein the first polymer sealing layer comprises polypropylene.

5. The apparatus of claim 1, wherein the second polymer layer comprises polyethylene terephthalate.

6. The apparatus of claim 1, wherein the open access hole comprises a hole sidewall and a claw-type seal within an interior portion of the cap, wherein the claw-type seal provides contact pressure with the throat opening of the container to seal the cap to the container.

7. The apparatus of claim 1, wherein a thermal-induced adhesion power of the first polymer sealing layer to the flat upper portion of the cap is greater than that of a peel force between that of the first polymer sealing layer to the aluminum foil layer and the aluminum foil layer to the second polymer layer.

8. The apparatus of claim 1, wherein a holding power of the first polymer sealing layer is greater than a shear force required to perforate the aluminum foil layer and the second polymer layer.

9. The apparatus of claim 1, wherein the second polymer layer is comprised of a dissimilar material to the cap, wherein the second polymer layer and the aluminum foil layer have a difference in releasing power compared to the first polymer sealing layer to the cap based on the differences in their respective materials.

10. The apparatus of claim 1, wherein a melting temperature of the first polymer sealing layer is higher than a melting temperature of the second polymer layer.

11. An apparatus for storing one or more fluids in a diagnostic analyzer in an in vitro diagnostics (IVD) environment, the apparatus comprising:

a container comprising one or more storage portions, each storage portion comprising a throat with a throat sidewall, an opening, and an outer surface of the opening;

one or more caps, each of the one or more caps corresponding to a respective one of the one or more storage portions, each cap comprising a sidewall, a top wall with an open access hole on and through the top wall, and a flat upper portion surrounding the open access hole, the cap configured to be attached to the throat of the storage portion of the container; and

one or more conduction seals, each of the one or more conduction seals corresponding to a respective one of the one or more caps, for sealing the open access hole of the cap, each conduction seal comprising:

a first polymer sealing layer configured to be heat-sealed to flat upper portion of the cap;

an aluminum foil layer arranged on top of the first polymer sealing layer and configured to heat seal the first polymer sealing layer by conductive heating to the flat upper portion of the cap; and

a second polymer layer arranged on top of the aluminum foil layer and configured to protect the aluminum foil layer and the first polymer sealing layer;

wherein the conduction seal is configured to be opened by a perforation device and hold an opened shape when perforated, while remaining adhered to the flat upper portion of the cap, to provide access to contents of the container via the opened shape, the open access hole of the cap, and the throat opening of the storage portion of the container.

12. The apparatus of claim 11, wherein the throat further comprises throat sidewall threads formed on the throat sidewall, wherein the cap further comprises cap threads formed

on an internal sidewall thereof, wherein the throat sidewall threads and the cap threads are configured to mate with one another to attach the cap to the throat of the storage portion of the container.

13. The apparatus of claim 11, wherein the aluminum foil layer transfers conductive heat to the first polymer sealing layer and the second polymer layer for molecular thermal seal bonding of the first polymer sealing layer to the flat upper portion of the cap; and wherein physical properties of the aluminum foil layer provide for the first polymer sealing layer and the second polymer layer shape to retain the opened shape when perforated.

14. The apparatus of claim 13, wherein the first polymer sealing layer and the cap are comprised of a same material.

15. The apparatus of claim 11, wherein the first polymer sealing layer comprises polypropylene, and wherein the second polymer layer comprises polyethylene terephthalate.

16. The apparatus of claim 11, wherein the open access hole comprises a hole sidewall and a claw-type seal within an interior portion of the cap, wherein the claw-type seal provides contact pressure with the throat opening of the storage portion of the container to seal the cap and the container.

17. The apparatus of claim 11, wherein a thermal-induced adhesion power of the first polymer sealing layer to the flat upper portion of the cap is greater than that of a peel force between that of the first polymer sealing layer to the aluminum foil layer and the aluminum foil layer to the second polymer layer.

18. The apparatus of claim 11, wherein a holding power of the first polymer sealing layer is greater than a shear force required to perforate the aluminum foil layer and the second polymer layer.

19. The apparatus of claim 11, wherein the second polymer layer is comprised of a dissimilar material to the cap, wherein the second polymer layer and the aluminum foil layer have a difference in releasing power compared to the first polymer sealing layer to the cap based on the differences in their respective materials.

20. The apparatus of claim 1, wherein a melting temperature of the first polymer sealing layer is higher than a melting temperature of the second polymer layer.

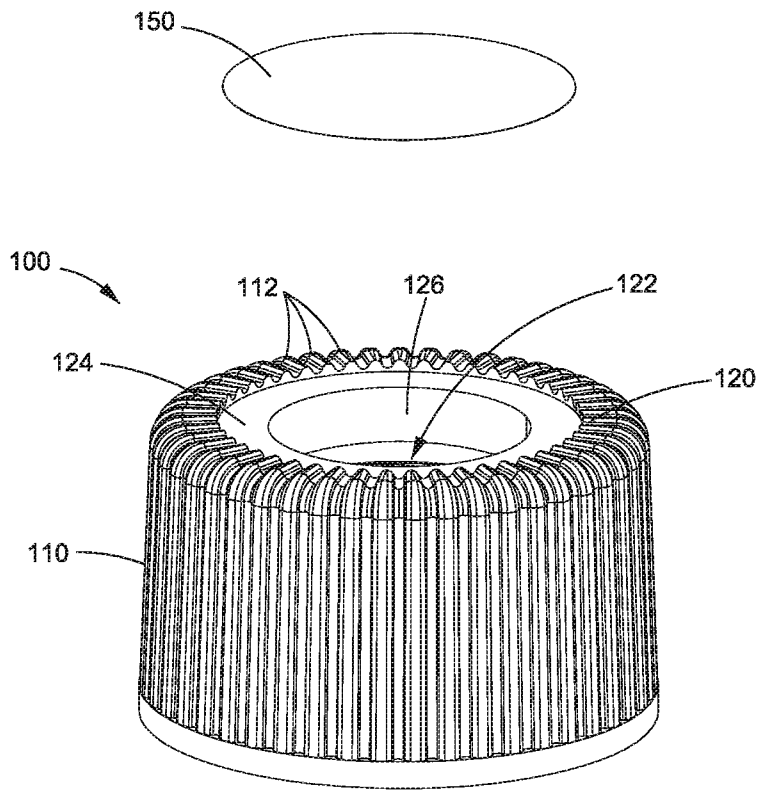


FIG. 1

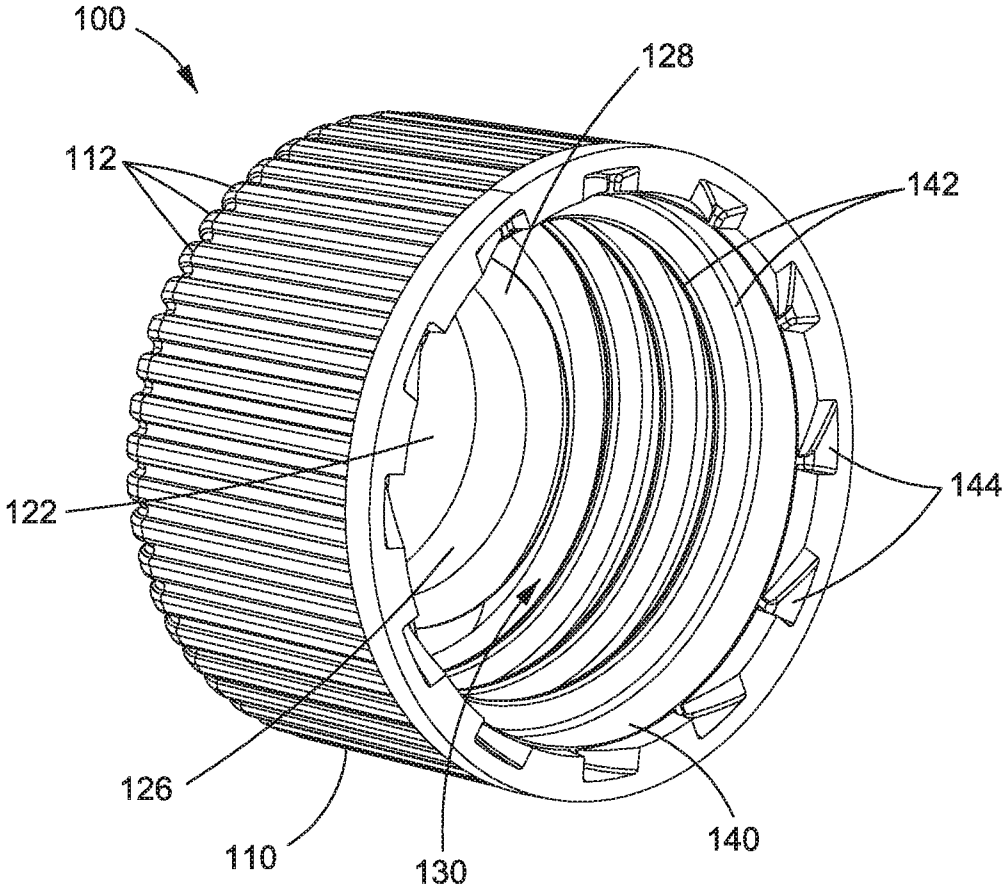


FIG. 2

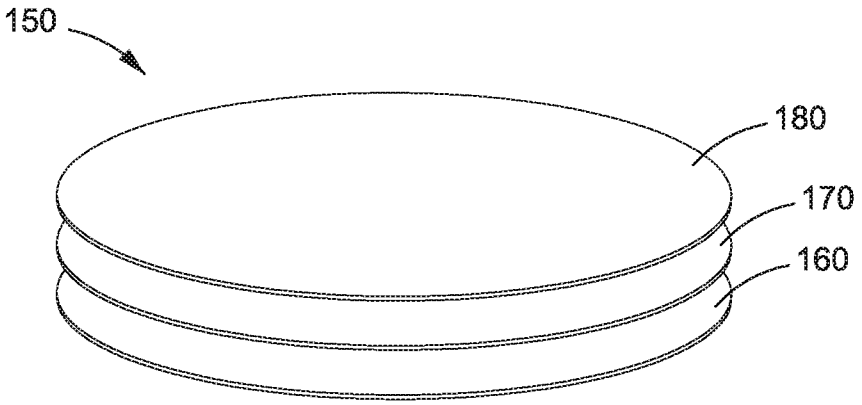


FIG. 3

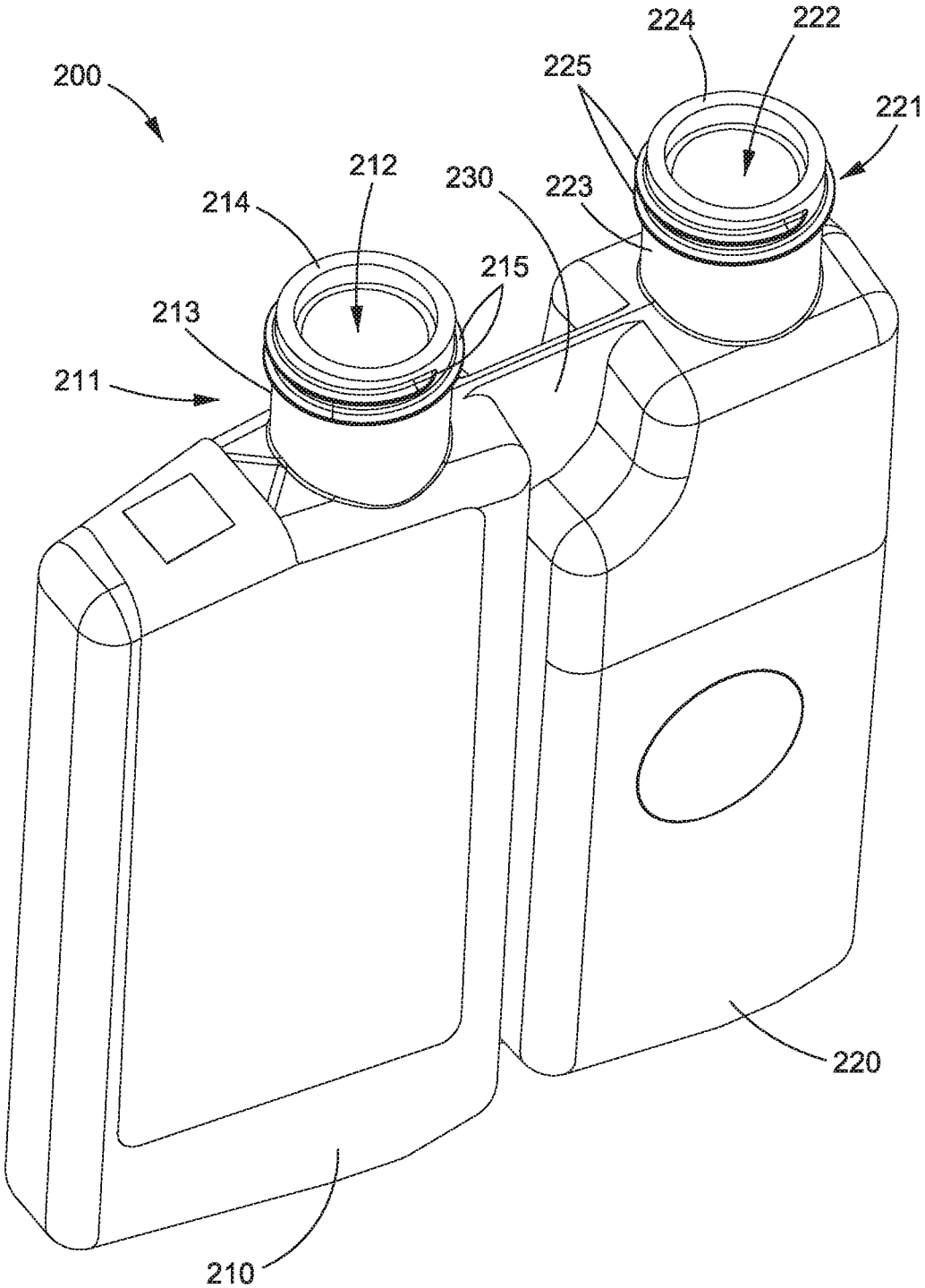


FIG. 4

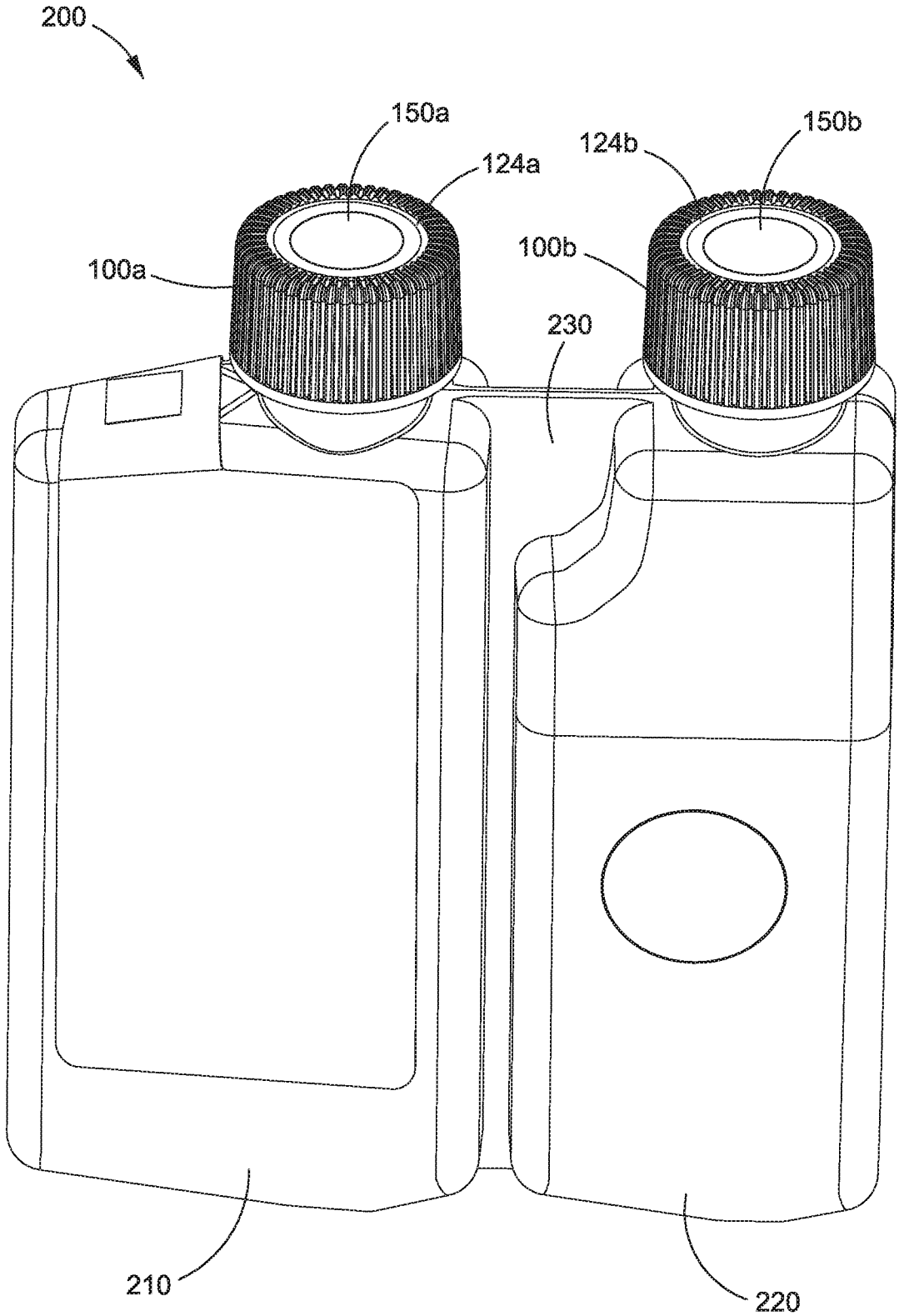
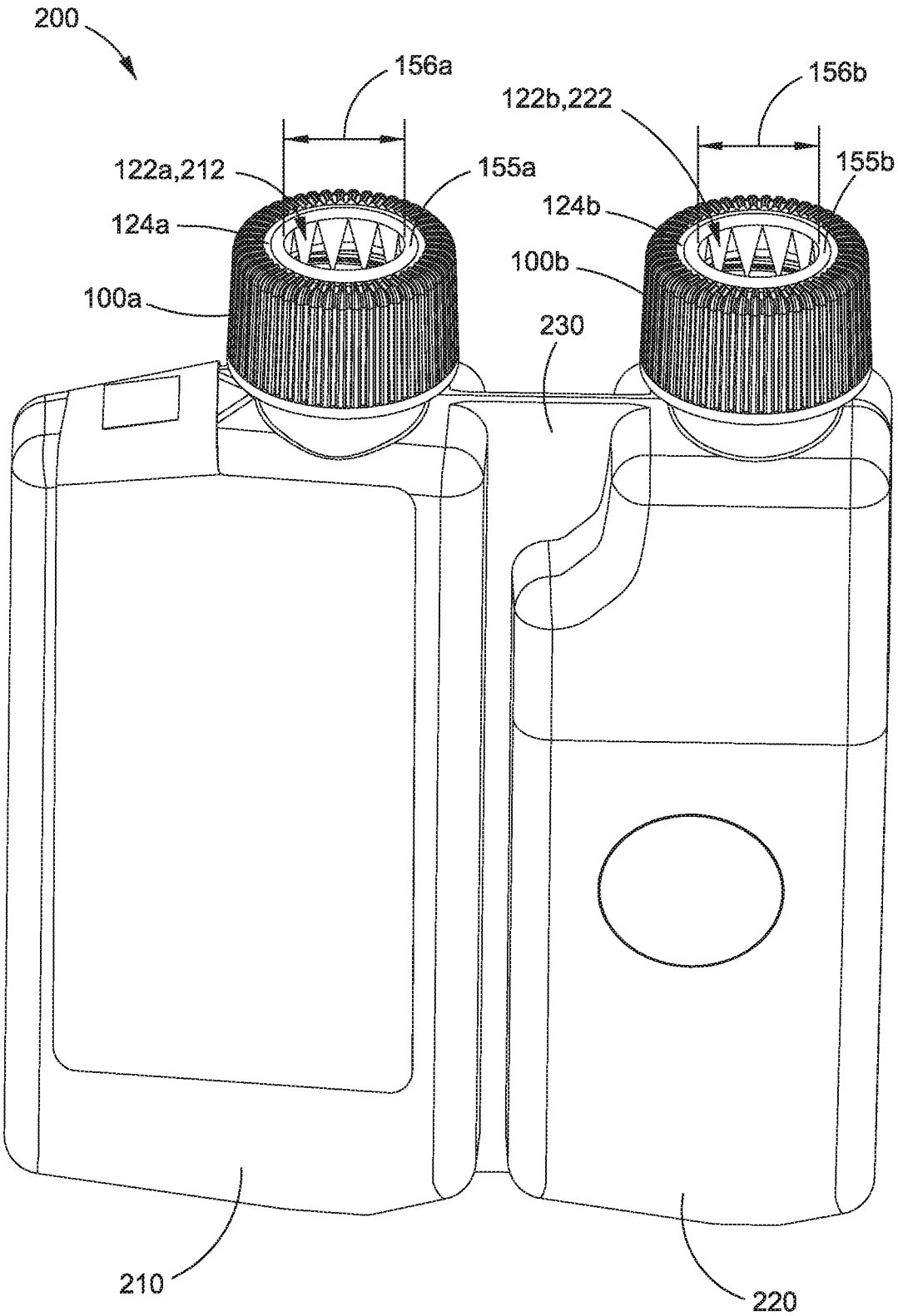


FIG. 5


200
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155b
124b
124a
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230
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220

FIG. 6

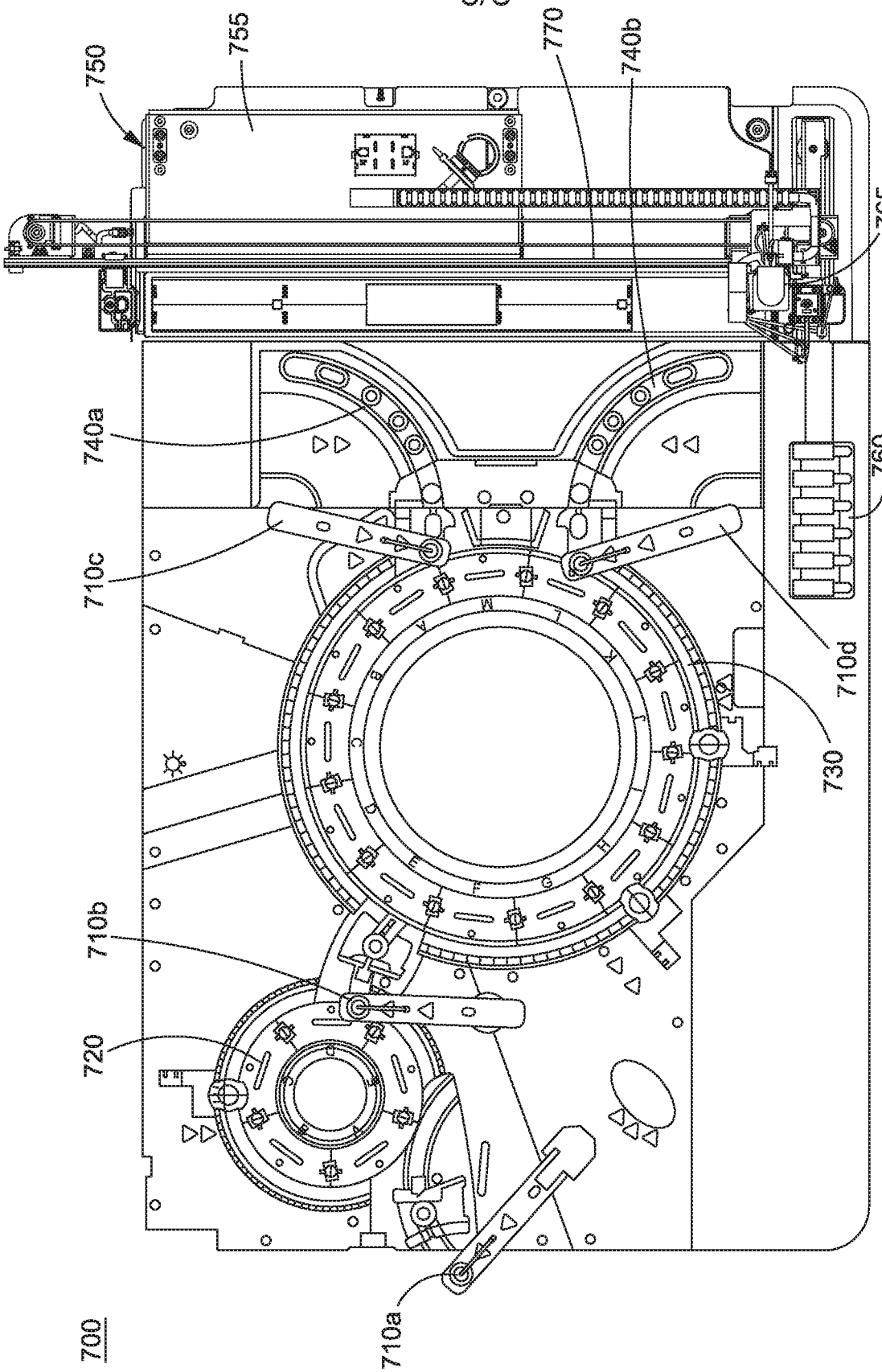

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US17/38864

A. CLASSIFICATION OF SUBJECT MATTER

IPC - B29C 65/02; B65B 7/28, 51/22; B65D 41/04, 51/20, 53/04 (2017.01)

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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)
See Search History document

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2014/0053662 A9 (KACIAN D. L.) February 27, 2014; figures 4, 6, 17; paragraphs [0046], [0049], [0052], [0063], [0064]	1-20
Y	US 2016/0003861 A1 (SIEMENS HEALTHCARE DIAGNOSTICS INC.) January 7, 2016; figures 3A-3C; paragraph [0067]	1, 11
Y	US 5,230,427 A (BETTS R. E. et al.) July 27, 1993; figures 4-7; column 5, lines 55-61; column 6, lines 43-54; column 7, lines 10-14; column 8, lines 55-61; column 14, lines 53-60	1-4, 6, 8-14, 16, 18-20
Y	US 2002/0079284 A1 (CARANO D. J.) June 27, 2002; figures 1-3; paragraphs [0029]-[0032]	5, 15
A	'Nylon or Polypropylene in Synthetic Turf' (ZEAGER BROS INC) April 17, 2016. Retrieved from the Internet on August 24, 2017. URL: <http://www.zeager.com/content/uploads/2016/04/Nylon-vs-PE-products.pdf>	10, 20
A	US 5,381,913 A (PEETERS D.) January 17, 1995; abstract; figures 1-3; column 3, lines 14-60	1-20
A	WO 2015/069546 A2 (SIEMENS HEALTHCARE DIAGNOSTICS INC.) May 14, 2015; entire document	1-20
A	US 2011/0120998 A1 (BRAUER J.) May 26, 2011; entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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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	Date of mailing of the international search report
25 August 2017 (25.08.2017)	15 SEP 2017
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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(51)Int.Cl.
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B65B 51/22(2006.01)
B65D 41/04(2006.01)
B65D 51/20(2006.01)
B65D 53/04(2006.01)

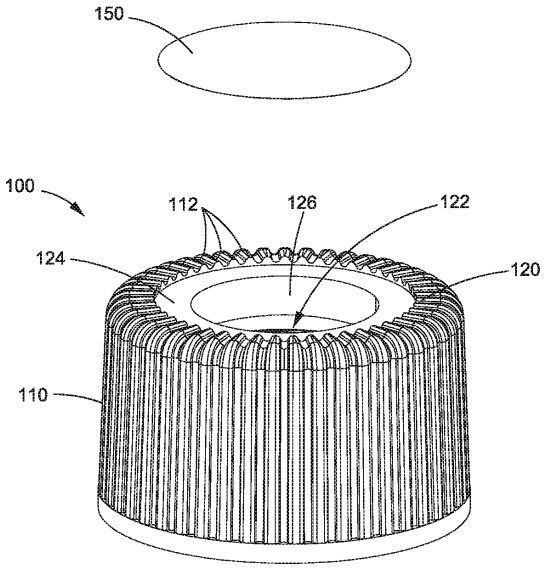
权利要求书3页 说明书7页 附图6页

(54)发明名称

具有设计为通过刺入诊断分析仪打开的密封件的可去除盖

(57)摘要

实施例涉及一种可去除盖,所述可去除盖具有用于密封容器的开口的传导密封件封壳。所述盖具有侧壁和顶壁,所述顶壁具有从其通过的开放接近孔。平坦上部包围所述开放接近孔,所述开放接近孔由所述传导密封件密封。所述传导密封件包括第一聚合物密封层、在所述第一层的顶部上用于将所述第一层热密封至所述盖的铝箔层、以及被布置在所述铝箔层的顶部上用于保护的第二聚合物层。所述铝箔提供可形成的成形强度以便使得在密封件刺入时,实现所述第一层和第三层的永久记忆铺展。所述盖的去除不会损坏所述密封件。在不与所被刺入的密封件进行探针接触的情况下实现对容器内容物的接近。



CN 109414885 A

1. 一种用于在体外诊断(IVD)环境中覆盖用在诊断分析仪中的试剂容器的设备,所述设备包括:

盖,所述盖包括侧壁、顶壁和平坦上部,所述顶壁具有在所述顶壁上且通过所述顶壁的开放接近孔,所述平坦上部包围所述开放接近孔,所述盖配置为附接至所述试剂容器的喉部,所述喉部包括开口;以及

传导密封件,所述传导密封件用于密封所述盖的所述开放接近孔,所述传导密封件包括:

第一聚合物密封层,所述第一聚合物密封层配置为被热密封至所述盖的所述平坦上部;

铝箔层,所述铝箔层被布置在所述第一聚合物密封层的顶部上,并且配置为通过传导加热将所述第一聚合物密封层热密封至所述盖的所述平坦上部;以及

第二聚合物层,所述第二聚合物层被布置在所述铝箔层的顶部上,并且配置为保护所述铝箔层和所述第一聚合物密封层;

其中,所述传导密封件配置为在保持附着至所述盖的所述平坦上部的同时,通过刺穿装置被打开并且在被刺穿时保持打开形状,以便经由所述打开形状、所述盖的所述开放接近孔以及所述容器的所述喉部开口提供对所述容器的内容物的接近。

2.根据权利要求1所述的设备,其中,所述铝箔层将传导热量传递至所述第一聚合物密封层和所述第二聚合物层以用于将所述第一聚合物密封层分子热密封结合至所述盖的所述平坦上部;并且其中,所述铝箔层的物理性质为所述第一聚合物密封层和所述第二聚合物层提供形状以便在被刺穿时保持所述打开形状。

3.根据权利要求2所述的设备,其中,所述第一聚合物密封层和所述盖由相同材料组成。

4.根据权利要求1所述的设备,其中,所述第一聚合物密封层包括聚丙烯。

5.根据权利要求1所述的设备,其中,所述第二聚合物层包括聚对苯二甲酸乙二醇酯。

6.根据权利要求1所述的设备,其中,所述开放接近孔包括孔侧壁和在所述盖的内部部分内的爪式密封件,其中,所述爪式密封件提供与所述容器的所述喉部开口的接触压力以便将所述盖密封至所述容器。

7.根据权利要求1所述的设备,其中,所述第一聚合物密封层至所述盖的所述平坦上部的热感应粘合力量大于所述第一聚合物密封层至所述铝箔层和所述铝箔层至所述第二聚合物层的力量之间的剥离力的力量。

8.根据权利要求1所述的设备,其中,所述第一聚合物密封层的保持力量大于刺穿所述铝箔层和所述第二聚合物层所需要的剪切力。

9.根据权利要求1所述的设备,其中,所述第二聚合物层由与所述盖不同的材料组成,其中,基于其相应材料的差异,与所述第一聚合物密封层至所述盖相比,所述第二聚合物层和所述铝箔层在释放力量上具有差异。

10.根据权利要求1所述的设备,其中,所述第一聚合物密封层的熔化温度高于所述第二聚合物层的熔化温度。

11.一种用于在体外诊断(IVD)环境中将一种或多种流体储存在诊断分析仪中的设备,所述设备包括:

容器，所述容器包括一个或多个储存部分，每个储存部分包括喉部，所述喉部具有喉部侧壁、开口以及所述开口的外表面；

一个或多个盖，所述一个或多个盖中的每一个与所述一个或多个储存部分中的相应一个储存部分相对应，每个盖包括侧壁、顶壁和平坦上部，所述顶壁具有在所述顶壁上且通过所述顶壁的开放接近孔，所述平坦上部包围所述开放接近孔，所述盖配置为附接至所述容器的所述储存部分的所述喉部；以及

一个或多个传导密封件，所述一个或多个传导密封件中的每一个与所述一个或多个盖中的相应一个盖相对应，以用于密封所述盖的所述开放接近孔，每个传导密封件包括：

第一聚合物密封层，所述第一聚合物密封层配置为被热密封至所述盖的平坦上部；

铝箔层，所述铝箔层被布置在所述第一聚合物密封层的顶部上，并且配置为通过传导加热将所述第一聚合物密封层热密封至所述盖的所述平坦上部；以及

第二聚合物层，所述第二聚合物层被布置在所述铝箔层的顶部上，并且配置为保护所述铝箔层和所述第一聚合物密封层；

其中，所述传导密封件配置为在保持附着至所述盖的所述平坦上部的同时，通过刺穿装置被打开并且在被刺穿时保持打开形状，以便经由所述打开形状、所述盖的所述开放接近孔以及所述容器的所述储存部分的所述喉部开口提供对所述容器的内容物的接近。

12.根据权利要求11所述的设备，其中，所述喉部进一步包括形成于所述喉部侧壁上的喉部侧壁螺纹，其中，所述盖进一步包括形成于其内部侧壁上的盖螺纹，其中，所述喉部侧壁螺纹和所述盖螺纹配置为彼此相配以便将所述盖附接至所述容器的所述储存部分的所述喉部。

13.根据权利要求11所述的设备，其中，所述铝箔层将传导热量传递至所述第一聚合物密封层和所述第二聚合物层以用于将所述第一聚合物密封层分子热密封结合至所述盖的所述平坦上部；并且其中，所述铝箔层的物理性质为所述第一聚合物密封层和所述第二聚合物层提供形状以便在被刺穿时保持所述打开形状。

14.根据权利要求13所述的设备，其中，所述第一聚合物密封层和所述盖由相同材料组成。

15.根据权利要求11所述的设备，其中，所述第一聚合物密封层包括聚丙烯，并且其中，所述第二聚合物层包括聚对苯二甲酸乙二醇酯。

16.根据权利要求11所述的设备，其中，所述开放接近孔包括孔侧壁和在所述盖的内部部分内的爪式密封件，其中，所述爪式密封件提供与所述容器的所述储存部分的所述喉部开口的接触压力以便密封所述盖和所述容器。

17.根据权利要求11所述的设备，其中，所述第一聚合物密封层至所述盖的所述平坦上部的热感应粘合力量大于所述第一聚合物密封层至所述铝箔层和所述铝箔层至所述第二聚合物层的力量之间的剥离力的力量。

18.根据权利要求11所述的设备，其中，所述第一聚合物密封层的保持力量大于刺穿所述铝箔层和所述第二聚合物层所需要的剪切力。

19.根据权利要求11所述的设备，其中，所述第二聚合物层由与所述盖不同的材料组成，其中，基于其相应材料的差异，与所述第一聚合物密封层至所述盖相比，所述第二聚合物层和所述铝箔层在释放力量上具有差异。

20.根据权利要求1所述的设备，其中，所述第一聚合物密封层的熔化温度高于所述第二聚合物层的熔化温度。

具有设计为通过刺入诊断分析仪打开的密封件的可去除盖

[0001] 相关申请的交叉引用

本申请要求于2016年7月1日提交的美国临时申请序列号62/357,912的优先权,其内容在此以引用的方式全部并入本文。

技术领域

[0002] 本发明大体上涉及一种用于用在诊断分析仪中的容器的盖和密封件,并且更具体地涉及具有可去除盖的容器,可去除盖具有传导结合密封件以便隐藏用在诊断分析仪中的试剂容器的口部。

背景技术

[0003] 盖(尤其是注射成型的螺旋盖)通常用于密封容器(诸如,瓶子)。盖的主要功能是使容器保持关闭和不漏直到容器的内容物将被使用。

[0004] 已知螺旋盖在被安装在由感应密封薄膜密封的容器上时能够合意地进行操作。这种盖内部的爪封突出可以用于向特定顶部接触区域或者容器的喉部顶表面的内部施加压力。这种盖和容器组件可以包括外部套筒,该外部套筒包围盖和容器界面。套筒可以防止泄漏并且提供对容器内容物的先前接近的视觉指示。

[0005] 其它设计包含密封薄膜,该密封薄膜包括在两个聚合物层之间的铝箔层。底部聚合物层通过铝箔层的感应加热被密封至容器的开口,因而使底部聚合物层熔化并且将其结合至容器。密封件用于保护容器的内容物并且形成容器的防漏封壳。对容器内容物的接近通过盖的去除和对感应密封薄膜的手动剥离或者刺穿来执行。然而,当用在需要高吞吐量的自动过程(诸如,诊断分析仪)中时,由于所需要的操作员招致的时间量和引入交叉污染物的机会,所以盖的手动去除和薄膜的剥离/刺穿是不受欢迎的。

[0006] 因此,需要在诊断分析仪中按照自动化方式提供对容器的内容物的接近,同时减小交叉污染和溢出的可能性。

发明内容

[0007] 实施例涉及一种可去除盖,该可去除盖具有用于密封容器的开口的传导密封件封壳。

[0008] 在一个实施例中,一种用于在体外诊断(IVD)环境中覆盖用在诊断分析仪中的试剂容器的设备,包括:盖,该盖包括侧壁、顶壁和平坦上部,顶壁具有在顶壁上且通过顶壁的开放接近孔,平坦上部包围开放接近孔,盖配置为附接至试剂容器的喉部,该喉部包括开口;以及传导密封件,该传导密封件用于密封盖的开放接近孔。传导密封件包括:第一聚合物密封层,该第一聚合物密封层配置为被热密封至盖的平坦上部;铝箔层,该铝箔层被布置在第一聚合物密封层的顶部上,并且配置为通过传导加热将第一聚合物密封层热密封至盖的平坦上部;以及第二聚合物层,该第二聚合物层被布置在铝箔层的顶部上,并且配置为保护铝箔层和第一聚合物层。传导密封件配置为在保持附着至盖的平坦上部的同时,通过刺

穿装置被打开并且在被刺穿时保持打开形状，以便经由打开形状、盖的开放接近孔以及容器的喉部开口提供对容器的内容物的接近。

[0009] 根据另一实施例，一种用于在体外诊断(IVD)环境中将一种或多种流体储存在诊断分析仪中的设备，包括：容器，该容器包括一个或多个储存部分，每个储存部分包括喉部，该喉部具有喉部侧壁、开口、以及开口的外表面；一个或多个盖，该一个或多个盖中的每一个与一个或多个储存部分中的相应一个储存部分相对应，每个盖包括侧壁、顶壁和平坦上部，顶壁具有在顶壁上且通过顶壁的开放接近孔，平坦上部包围开放接近孔，盖配置为附接至容器的储存部分的喉部；以及一个或多个传导密封件，该一个或多个传导密封件中的每一个与一个或多个盖中的相应一个盖相对应，以用于密封盖的开放接近孔。每个传导密封件包括：第一聚合物密封层，该第一聚合物密封层配置为被热密封至盖的平坦上部；铝箔层，该铝箔层被布置在第一聚合物密封层的顶部上，并且配置为通过传导加热将第一聚合物密封层热密封至盖的平坦上部；以及第二聚合物层，该第二聚合物层被布置在铝箔层的顶部上，并且配置为保护铝箔层和第一聚合物层。传导密封件配置为在保持附着至盖的平坦上部的同时，通过刺穿装置被打开并且在被刺穿时保持打开形状，以便经由打开形状、盖的开放接近孔以及容器的储存部分的喉部开口提供对容器的内容物的接近。

附图说明

[0010] 当结合附图来阅读如下详细描述时，本发明的前述方面和其它方面将得到最佳理解。出于图示本发明的目的，在附图中示出了当前优选的实施例，然而应理解，本发明不限于所公开的特定手段。在附图中包括的是如下附图：

图1是根据实施例的描绘了盖和密封件的视图的图表；

图2是根据实施例的描绘了盖的各方面的图表；

图3是根据实施例的图示了多层密封件的各方面的图表；

图4是根据实施例的示例性容器的图表；

图5图示了根据实施例的与具有密封件的盖附接的示例性容器；

图6图示了根据实施例的与具有密封件的盖附接的示例性容器，其中密封件被穿刺；

图7是根据实施例的可以在其内使用本发明的实施例的示例系统架构的布局。

具体实施方式

[0011] 实施例涉及一种可去除盖，该可去除盖具有用于密封容器的开口的传导密封件封壳。有利地，根据本文所提供的实施例，当用在诊断分析仪中时，具有密封件的盖不需要被去除以使探针接近容器的内容物，因而消除盖去除和/或密封件剥离或者刺穿的操作员步骤。然而，具有密封件的盖可以在不用使密封件的完整性作出折衷的情况下被去除。

[0012] 根据实施例，盖和密封件组合的自动打开是在不用从容器上去除盖和密封件的情况下通过穿刺密封件来提供。密封件有利地保持其对容器的内容物进行畅通非接触式探针接近所需要的打开形状。交叉污染和水平感测问题通过防止探针无意地与表面而非容器的内容物接触来解决。

[0013] 尽管针对用于用在诊断或者临床分析仪中的试剂容器对实施例进行了描述，但本发明并不限于此。本文所提供的盖和密封件可以用在任何类型的环境中，在这些环境中，期

望打开容器上的密封件以接近容器中容纳的内容物。

[0014] 参照图1和图2，根据实施例图示了盖100的特征。图1还包括根据实施例对密封件150的图示。图1是盖100和密封件150的立体图，并且图2提供了盖100的底侧立体图。

[0015] 盖100由侧壁110和顶壁120组成。侧壁110和顶壁120限定出盖100的内部部分130(见图2)。

[0016] 如在图1和图2的实施例中示出的，侧壁110和顶壁120的一部分可以在其外表面上具有一系列脊状物112以便帮助夹持盖100。盖100不限于该配置，并且侧壁110和/或顶壁120相反可以具有平滑外表面或者其它表面纹理。

[0017] 继续参照图1和图2，开放接近孔122形成于盖100的顶壁120中并且通过顶壁120。在实施例中，开放接近孔122是顶壁120中的中心孔。顶壁120的包围开放接近孔122的一部分由上平坦部124(见图1)、孔侧壁126(见图1和图2)以及爪式密封件128(见图2)组成。在实施例中，如在图1中示出的，上平坦部124是相对于顶壁120的周围区域的凹陷部分。

[0018] 如在图2中示出的，盖100的内部侧壁140可以包括螺纹142和/或一个或多个突片或者144 以用于将盖100连接至容器，如下文所描述的。盖100不限于内部侧壁140的这种配置，并且相反可以使用其它设计，诸如，例如，具有用于将盖100卡扣配合到容器上的部件的内部侧壁140。

[0019] 在实施例中，盖100由聚丙烯(诸如，高密度聚丙烯)或者其它聚合物材料形成，但盖100不限于此。在实施例中，盖100的上平坦部124由聚丙烯形成，而盖100的剩余部分则可以由另一种材料形成。

[0020] 如在图1中示出的，密封件150是大体圆形形状。圆形形状的密封件150的大小被设置为配合在盖100的上平坦部124内以便隐藏盖100的开放接近孔122。开放接近孔122和密封件150不限于圆形形状，并且可以使用其它形状。根据实施例，密封件150的大小被设置为隐藏开放接近孔122和盖100的上平坦部124的绝大(即，大于50%)部分。在实施例中，密封件150的大小被设置为当根据本文所描述的实施例被密封至盖100时隐藏盖100的大体上整个上平坦部124。

[0021] 图3是根据实施例的图示了密封件150的附加方面的图表。根据实施例，密封件150由三个层组成：第一(底部)聚合物密封层160，该第一(底部)聚合物密封层160包括能够被热密封至盖100的上平坦部124的可热密封聚合物；铝箔(中间)层170，该铝箔(中间)层170被布置在第一聚合物密封层160的顶部上，包括铝箔以便通过铝的传导加热来热密封第一聚合物密封层160；以及第二(顶部)聚合物层180，该第二(顶部)聚合物层180被布置在铝箔层170的顶部上，配置为保护铝箔层170和第一聚合物密封层160。

[0022] 在实施例中，第一聚合物密封层160包括聚丙烯，并且第二聚合物层180包括聚对苯二甲酸乙二醇酯。在实施例中，包括聚对苯二甲酸乙二醇酯的第二聚合物层180与铝箔层170一起形成层压件。

[0023] 根据本文的实施例，第一聚合物密封层160通过应用热能(来自铝箔层170的传导加热)和接触压力来执行密封粘合功能，以便导致聚丙烯第一聚合物密封层160和聚丙烯盖100的两种匹配材料成分的分子结合。

[0024] 根据本文的实施例，铝箔层170执行如下功能：将热量传递至聚丙烯第一聚合物密封层160以用于将第一聚合物密封层160分子热密封结合至盖100的上平坦部124；铝箔层

170的可形成和“记忆”成形特性引入形状保持能力以及因此使第一聚合物密封层160和第二聚合物层180“保持打开”的能力。

[0025] 根据实施例，第二聚合物层180暴露于盖100、密封件150和容器200周围的外部环境，因而为第一聚合物密封层160和铝箔层170提供保护层以免与周围环境或者对污染的外部暴露有关的降解。这样，第二聚合物层180是抗周围环境、蒸汽和水的密封件。

[0026] 图4是可以与具有密封件150的盖100一起使用的示例性容器200的图表。也可以使用其它类型的容器或者容器200的变型，并且盖100和密封件150组合不限于本文所描述的示例性容器200的使用。在PCT专利申请序列号PCT/US14/019078中提供了示例性试剂容器的详细特征，其内容在此以引用的方式全部被包含在本文中。

[0027] 根据实施例，如在图4中示出的，容器200由两个储存部分(或者包)210、220组成，例如，这两个储存部分(或者包)210、220配置为保持流体(例如，试剂流体)或者其它材料(例如，粉末)以用于在诊断分析仪上进行特定机载诊断测试。夹持部分230可以在两个储存包210、220之间延伸并且在实施例中是大体上平坦的表面，该大体上平坦的表面可以具有设在其上的一个或多个突出或者夹持部分。

[0028] 根据本文所提供的实施例，每个储存部分210、220分别包括喉部211、221，具有密封件150的盖100可以附接至喉部211、221。喉部211包括开口212、喉部侧壁213以及喉部侧壁213的顶表面214(即，开口212的外表面)。喉部侧壁螺纹215可以形成于喉部侧壁213上以用于与盖100的内部侧壁140的螺纹142相配。如上文所指出的，容器200和盖100不限于螺纹配置，并且相反每一个可以具有用于使盖100和容器200相配在一起的其它部件或者特性(例如，卡扣配合部件等)。盖100的爪式密封件128使得盖100用作喉部侧壁213的顶表面与盖100之间的密封件。

[0029] 类似于喉部211，喉部221包括开口222、喉部侧壁223以及喉部侧壁223的顶表面224(即，开口222的外表面)。喉部侧壁螺纹225可以形成于喉部侧壁223上以用于与盖100的内部侧壁140的螺纹142相配。

[0030] 当然，本文参照图4所示出和描述的容器200仅仅是示例性的并且不限于本文所公开的具有密封件150的盖100。在实施例中，根据本文所提供的实施例，例如，待与盖100和密封件150组合一起使用的容器可以具有单个储存部分。而且，容器200或者其变型不需要用于储存用于用在诊断分析仪中的试剂流体。

[0031] 图5描绘了根据实施例的具有盖和密封件100a-150a、100b-150b的示例性容器200，盖和密封件100a-150a、100b-150b分别附接至喉部侧壁213、223以便覆盖开口212、222。如在图5中示出的，示出了每个盖100a、100b的平坦上部124a、124b的包围相应密封件150a、150b的一部分。

[0032] 图6图示了具有盖100a、100b的示例性容器200，盖100a、100b具有附接至喉部211、221的经穿刺密封件155a、155b。如在图6中示出的，经穿刺密封件155a、155b(经由穿刺工具穿刺的密封件150a、150b)经由经穿刺密封件155a、155b的开口156a、156b提供对容器200的内容物的接近。如所示出的，容器200的开口212、222是可通过盖100a、100b的开放接近孔122a、122b经由经穿刺密封件155a、155b的开口156a、156b接近的(即，对容器200的内容物的完全开放接近)。根据实施例，该接近是在不用探针或者仪器与经穿刺密封件155a、155b接触的情况下实现的。

[0033] 根据实施例，第一聚合物密封层160至盖100的热感应粘合(即，保持)力量(power)大于第一层160至第二层170和第二层170至第三层180的力量之间的剥离力的力量。

[0034] 在实施例中，第一聚合物密封层160的保持力量大于刺穿铝箔层170和第二聚合物层180所需要的剪切力。

[0035] 在实施例中，第一聚合物密封层160的熔化温度高于第二聚合物层180的熔化温度。

[0036] 在实施例中，通过在密封件150至盖100的传导密封过程期间将力方向与通过盖100的平坦上部124施加至密封件150的热量组合起来，获得第一聚合物密封层160至盖100的对应保持力量。

[0037] 在实施例中，基于其相应材料的差异，与传导地结合至盖100的上平坦部124的第一聚合物密封层160相比，第二聚合物层180和铝箔层170在释放力量上具有差异。

[0038] 根据实施例，在盖100连接至(例如，被拧紧至)容器200并且密封件150被放置在盖100的上平坦部124内并且在其内居中时，盖100和密封件150根据本领域的普通技术人员已知的方法暴露于传导热源，其中，通过加热铝箔层170，将热量传递至可熔化层(即，第一聚合物密封层160)。热传导使得第一聚合物密封层160的附接是连续的并且没有空隙，以便使得通过来自两个表面(即，盖100的上平坦部124和第一聚合物密封层160的底侧)的材料的混合来使第一层160被分子结合。向铝箔层170施加热量会使得密封件150的聚合物表面(即，第一聚合物密封表面160)熔化，从而导致第一聚合物密封层160分子结合至盖100。在热传导之后去除盖100不会使盖100的密封表面具有空隙或者作出折衷，并且密封封壳会保持直到其被穿刺装置刺入或者穿刺。通过开启工具或者穿刺装置的穿透对密封件150的刺入会产生密封件150的底侧卷曲形状(即，如在图6中示出的经穿刺密封件155a、155b和密封开口156a、156b)，由于密封层压件的铝箔层170的张力，所以密封件150保持打开。对密封件150的刺入或者穿刺可以通过自动化来完成，但也可以用操作员所使用的手工工具来手动地完成。

[0039] 根据本文所提供的实施例，盖100凭借与容器喉部211、221 的顶表面214、224的爪封接触128而用作密封件。包围开放接近孔122的顶盖表面(即，上平坦部124)用于应用多层密封件150的压力/热量传导密封过程。盖100中的中心开放接近孔122设置用于自动(刺入式)密封件150打开以便有益于对容器200的内容物的自动或者手动接近。根据本文所提供的实施例，提供了紧接密封盖(100-150)的去除(例如，用于添加剂的添加)、对容器200的内容物的接近、以及对盖100的再关闭。聚合物盖100与第一聚合物密封层160之间的常见材料使得盖100传导过程能够将密封件150附着至盖100。盖100还经由开放接近孔122将刺入工具的大小限制于容器200的中心喉部区域(即，喉部211、221)。该刺入动作会引入开口“形状保持”，这是由撞击在层160、180上并且将铝箔层170的突出保留到容器喉部211、221中的易延展铝箔层170刺穿所导致。根据本文所提供的实施例，提供了如下能力：通过对盖100加上密封件150的组合的拧松和去除来接近容器200的内部内容物、在外部密封件150保持完好的同时重新安装盖100、以及通过刺入密封件150来自动打开。根据本文所提供的实施例，尽管不必穿透密封件150，但一旦执行了通过密封件150的刺穿，铝箔层170就保持开口156的经穿刺形状以便有益于连续地接近容器200的内容物。对密封件150的穿透会导致对接近孔156的大小的形成和控制。仅仅受到开放接近孔122的大小的限制，卷曲接近凸缘然后成为

用于保持开口并且防止探针与密封件破坏突出接触的物理方法(见图6)。这些铝突出维持密封件150的分离并且防止密封开口156的缩回或者再关闭,因而消除探针与沉积在密封件150上的送气和雾化颗粒的接触污染。密封件150即使在盖100随后被去除的情况下也保持附接至盖100。接近探针与密封材料突出的接触问题得以防止并且铝和聚合物密封件150在容器200上保持打开且保持在位。在密封件150不会干扰接近探针的情况下提供了对容器200的重复探针接近(包括使容器200清空)。

[0040] 如本文所公开的,盖100与密封件150进行组合以便覆盖容器200和提供对其中容纳的内容物的接近,这具有多个优点:具有密封件150的盖100会防止内容物浪费和溢出;减少操作员引起的溢出;减少污染事件;增加易用性和可操作性。此外,防止了由于探针与无意污染接触所引起的仪器误差,从而提高了对客户的可靠性和性能。在诊断分析仪实施例中,其中,容器200用于试剂,在试剂探针单次或者全周期装载期间,通过形成没有密封件阻碍的大量接近目标(即,经穿刺密封开口156a、156b),用于试剂探针的容器密封件150的自动打开和制备会增加仪器性能的价值。消除了所观察到的由于探针与密封材料接触所引起的非使用时间。由于提高了试剂探针接近的可靠性以及消除了当前的大量操作员时间,所以增加了客户利益。

[0041] 图7提供了根据实施例的可以在其内实施本发明的实施例的示例系统架构700的布局。在图7中示出的是:具有相应探针的多个转移臂710(710a、710b、710c和710d);稀释转盘720,该稀释转盘720包括被布置在一个或多个稀释环中的多个稀释容器;反应转盘730,该反应转盘730包括被布置在一个或多个反应环中的多个反应容器;以及专用于储存和供应相应试剂的试剂储存区域740a和740b,每个试剂储存区域740a和740b包括用于多个试剂容器200的空间。在操作中,转移臂710a及其相应探针可以操作以将样品从接近位置转移至稀释转盘720上的一个或多个稀释容器,以便在其中产生稀释物。转移臂710b及其相应探针可以操作以将稀释物从稀释容器转移至反应转盘730上的反应容器。转移臂710c和710d及其相应探针可以操作以分别将试剂从试剂储存区域740a和740b转移至反应转盘730上的反应容器。该多次转移通过使用泵送机构(未示出)(诸如,例如,附接至转移臂710的往复式泵)而发生。此外,系统架构700包括一个或多个控制器(未示出)以用于控制各个部件(包括转移臂710、探针、以及转盘)的操作。

[0042] 系统架构700中还包括的是试剂搬运系统750以用于向和/或从试剂储存区域740a和740b转移一个或多个容器200。根据实施例,试剂搬运系统750包括试剂服务器模块755,在实施例中,该试剂服务器模块755是冷藏储存壳罩,该冷藏储存壳罩包括用于储存试剂容器200的一个或多个转位环。

[0043] 托盘760配置为保持一个或多个容器200以用于向和从试剂服务器模块755转移。操作员可接近托盘760以手动地向和从托盘760装载和卸载容器200,托盘760可以在轨道上移动。

[0044] 在实施例中,夹持器组件765设置用于在托盘760与试剂服务器模块755之间自动地转移容器200(根据本文所公开的实施例,容器200具有盖100和密封件150)。夹持器组件765在夹持容器200的同时沿着水平转移臂770移动以便转移容器200。在实施例中,夹持器组件765包括一对夹持器指状物,该对夹持器指状物竖直地且彼此相对地定向以用于夹持容器200的一部分并且用于在不用去除具有密封件150的盖100的情况下穿刺或者刺入附接

至容器200的盖100的密封件150。

[0045] 图7的系统架构700以及伴随的描述仅仅是示例性的并且不限于本文所公开的盖100和密封件150。系统架构700仅仅是可以在其中使用盖100和密封件150的一个示例系统。

[0046] 尽管已经参照示例性实施例对本发明进行了描述，但其并不限于此。本领域的技术人员将理解，可以对本发明的优选实施例做出许多改变和修改并且这些改变和修改可以是在不背离本发明的真正精神的情况下做出的。因此，所附权利要求书意在被理解为涵盖所有这种落在本发明的真正精神和范围内的等效变型。

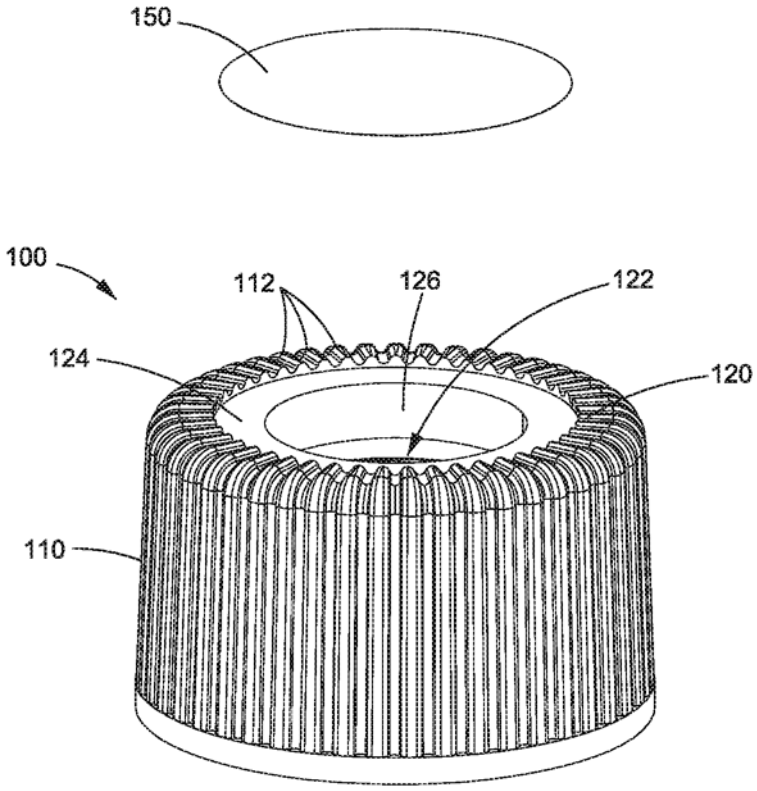


图 1

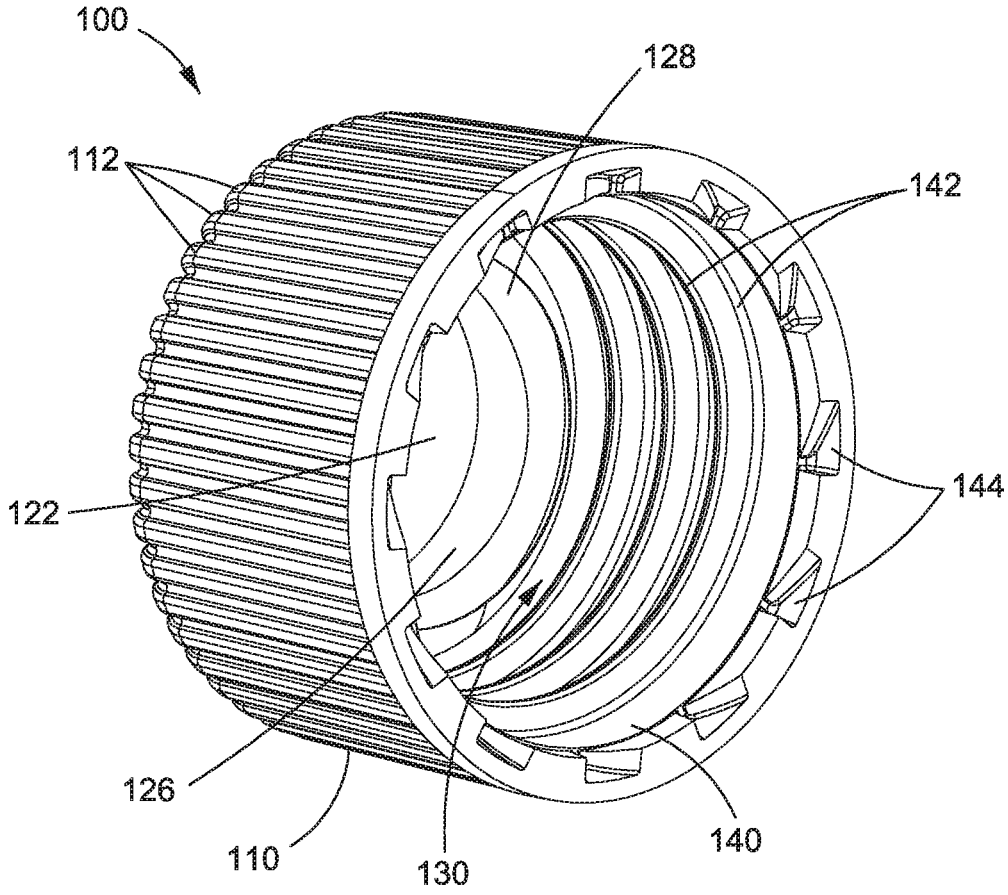


图 2

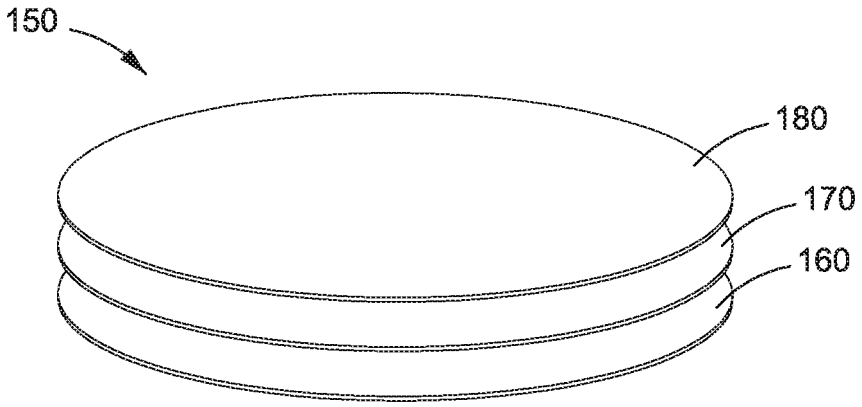


图 3

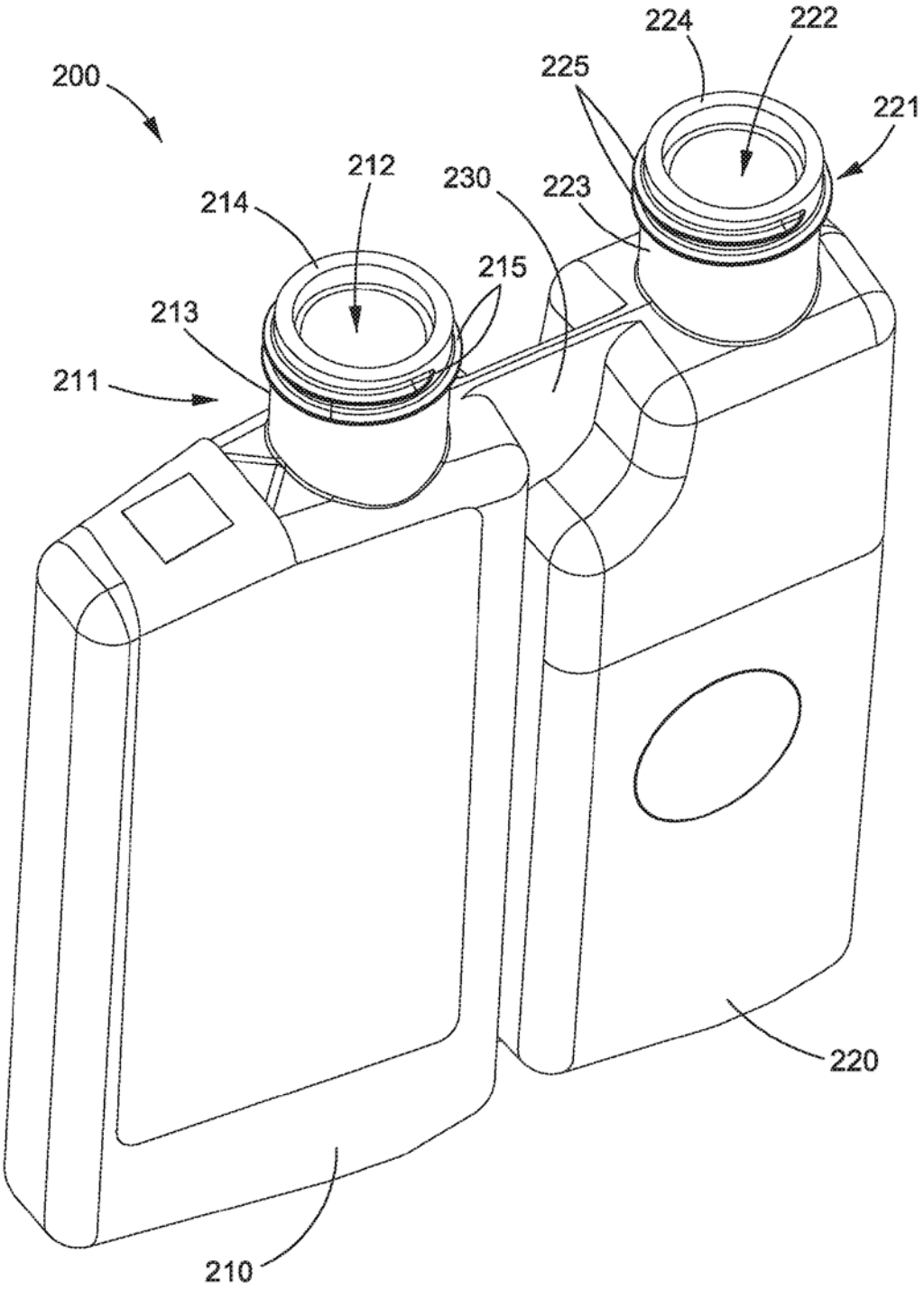


图 4

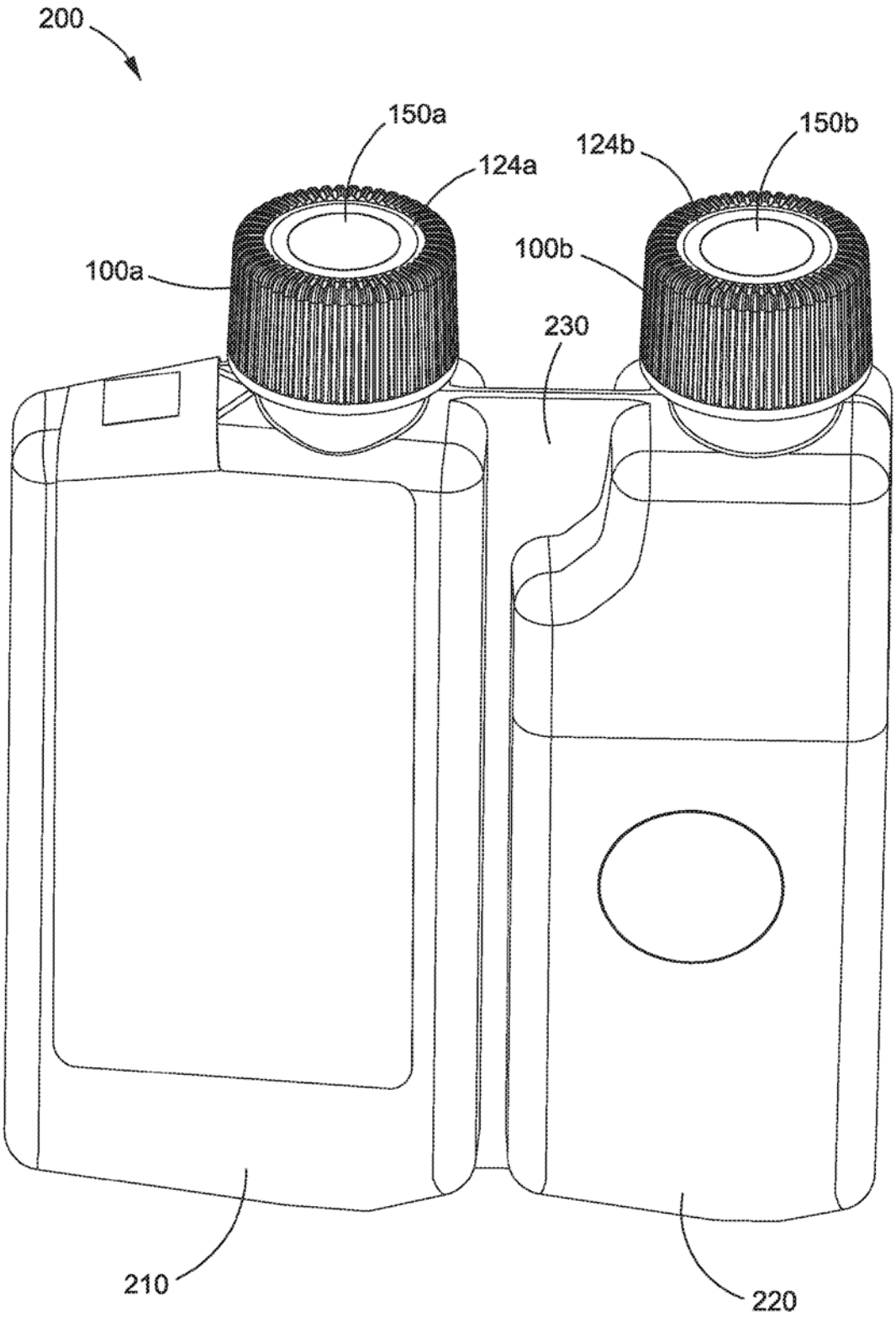


图 5

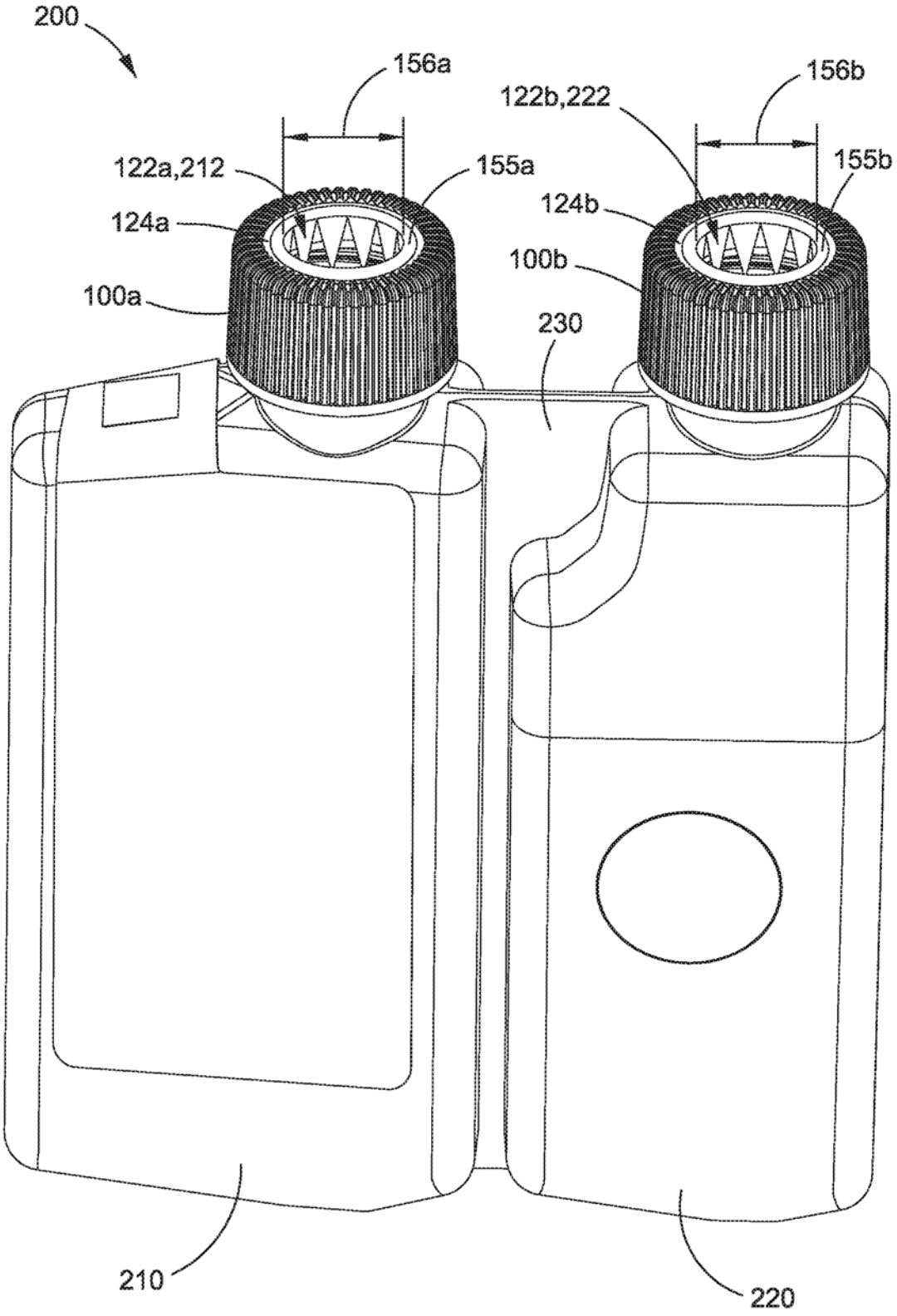

200
156a
156b
122b,222
122a,212
155a
155b
124b
124a
100b
100a
230
210
220

图 6

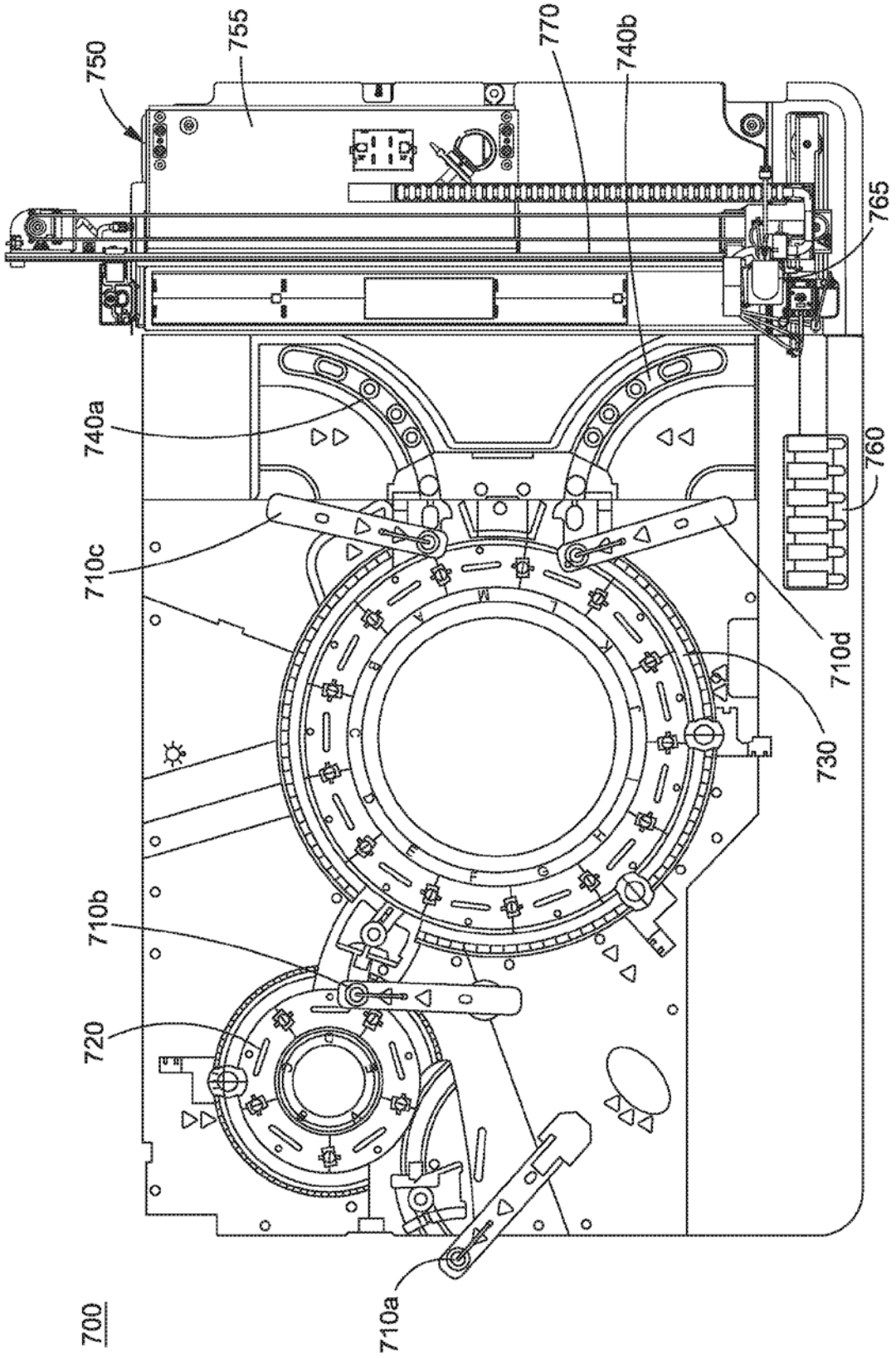


图 7