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(54) **CAM LID FOR DRINKING VESSEL**

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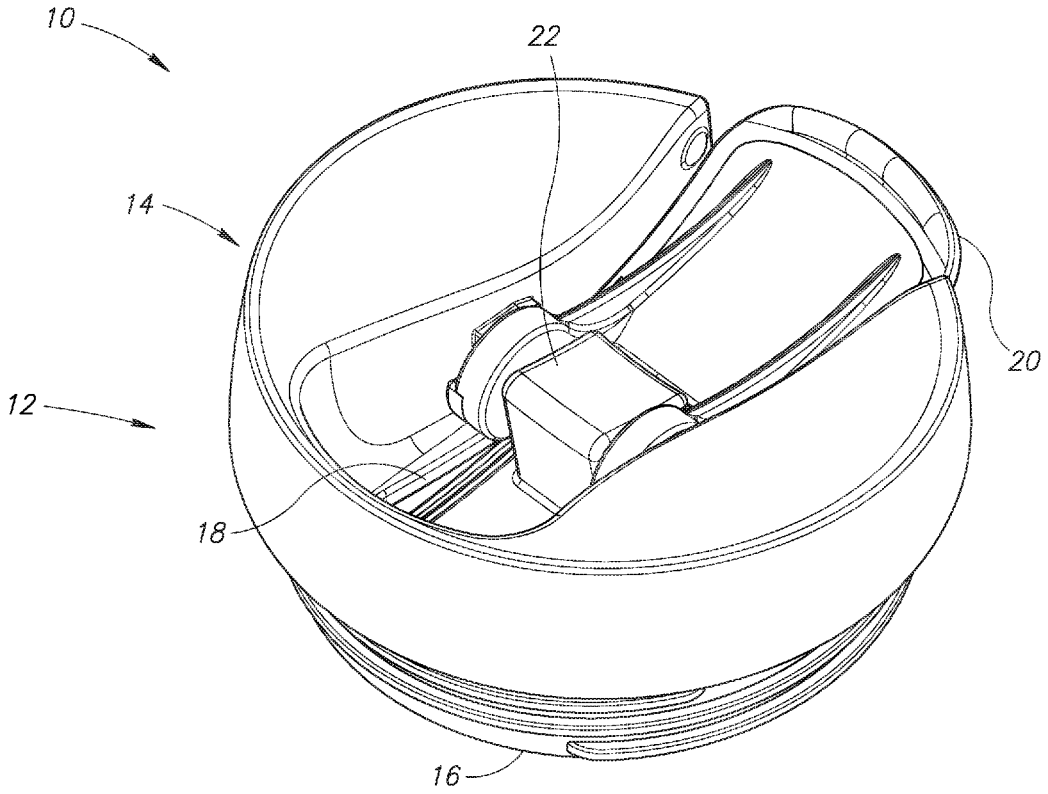
B65D 43/02	(2006.01)

(52) **U.S. Cl.**

CPC ***B65D 43/265*** (2013.01); ***B65D 47/0895*** (2013.01); *B65D 2543/00046* (2013.01); *B65D 2251/009* (2013.01); *B65D 2251/0081* (2013.01); *B65D 2251/0028* (2013.01); *B65D 2251/0021* (2013.01); ***B65D 51/18*** (2013.01); ***B65D 43/16*** (2013.01); ***B65D 43/02*** (2013.01)

(57) **ABSTRACT**

A lid assembly including a camming lever and a sealing member for selectively sealing and unsealing a drinking aperture of a lid main body. The camming lever is rotatably to selectively move the sealing member between a sealed position adjacent to and an unsealed position spaced apart from the drinking aperture. The camming lever includes a lever arm extending from two cams having a cam axle extending therebetween. The cam axle is pivotally attached to the sealing member, which is pivotally attached to the lid main body. The cams engage an upper surface of the lid main body. A stub axle extends laterally outward from each cam and engages a ledge which limiting upward movement of the cams.



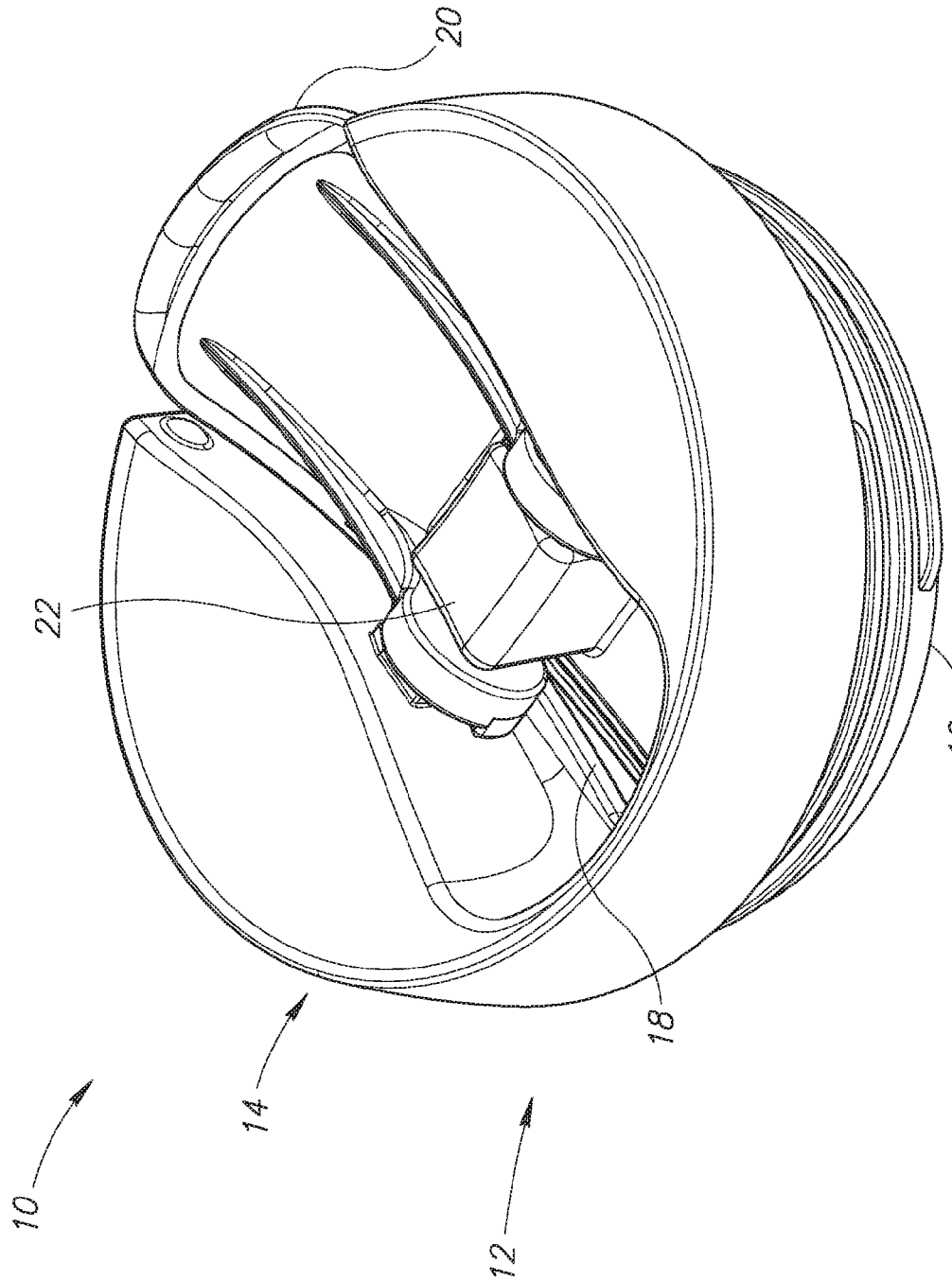


FIG.1A

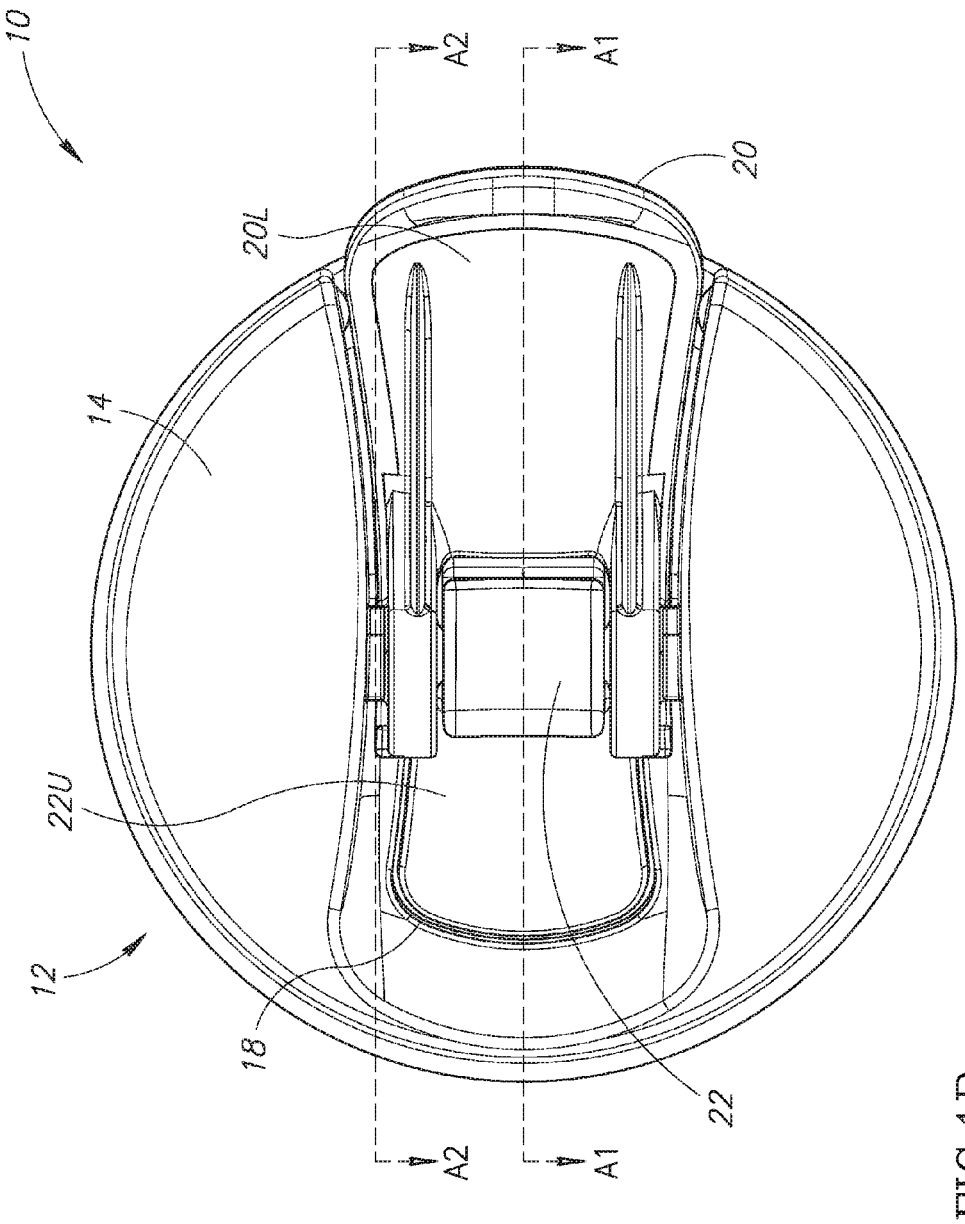


FIG.1B

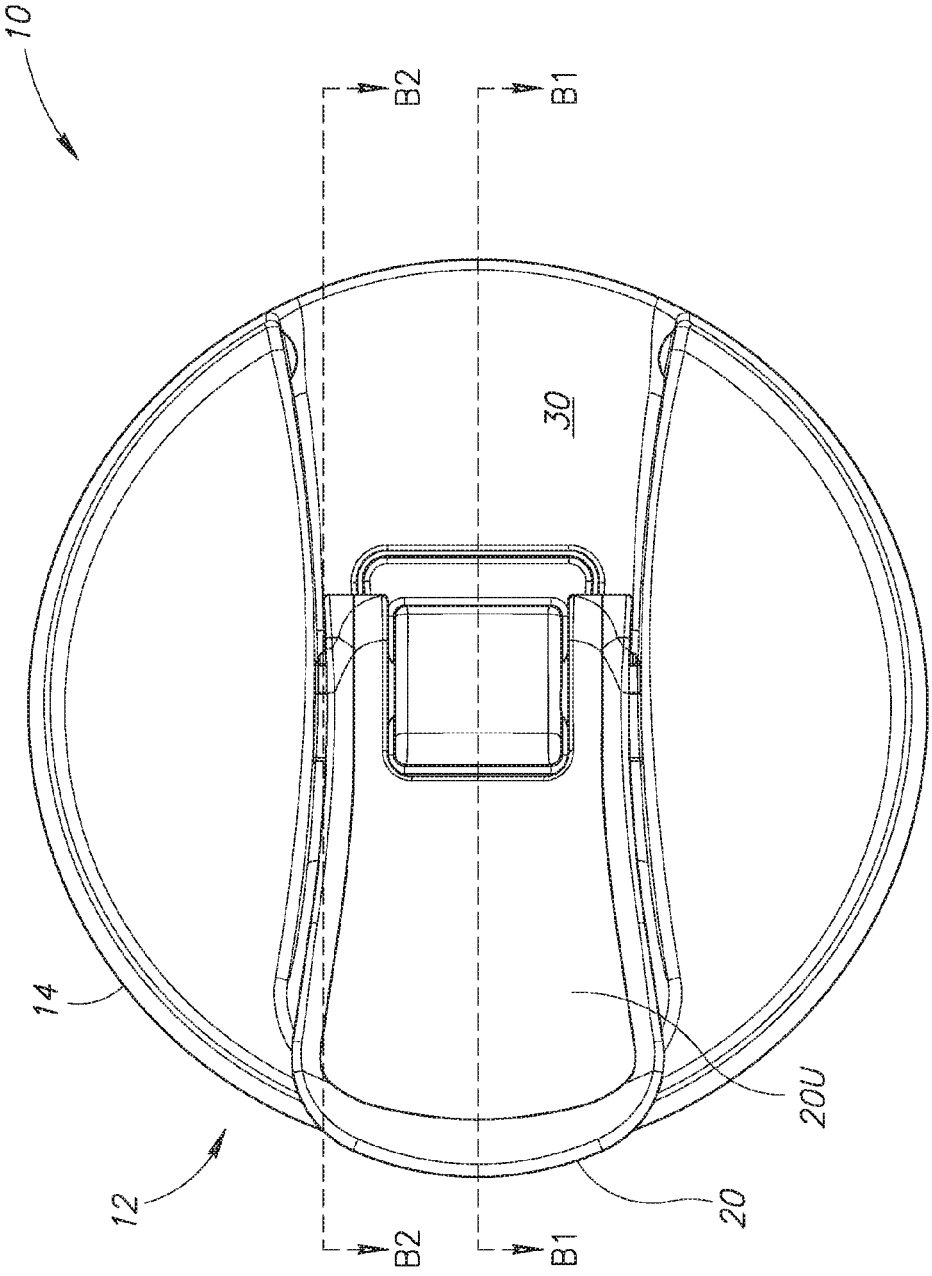


FIG.1C

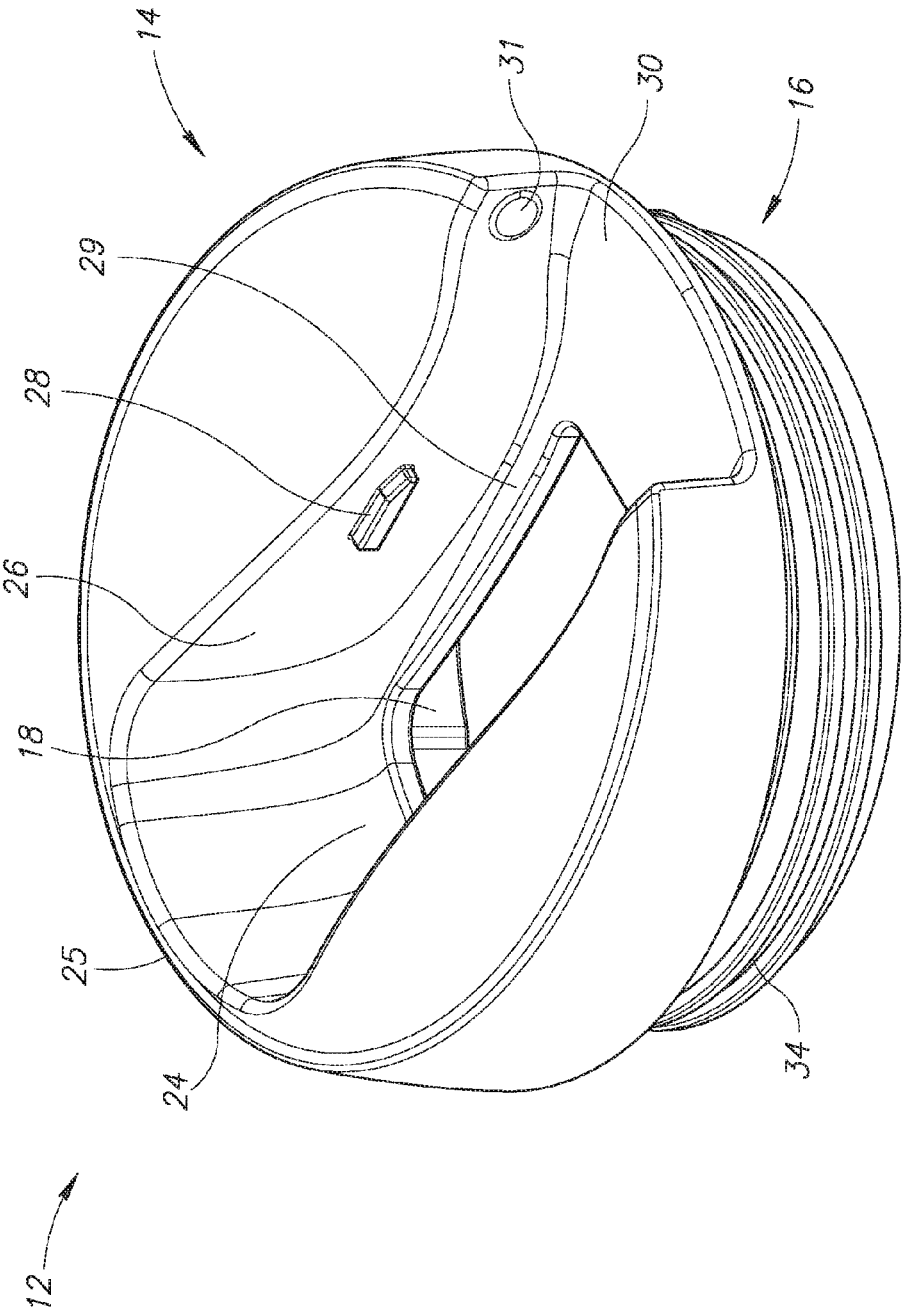


FIG.2A

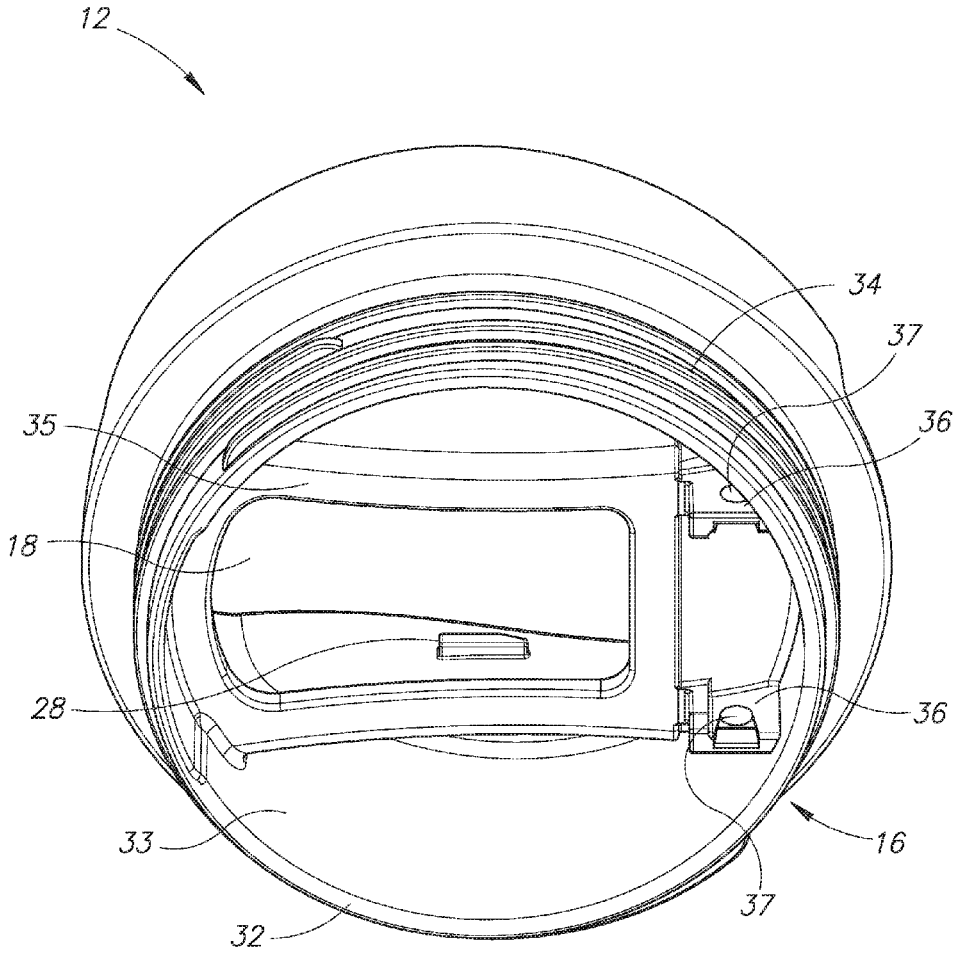


FIG.2B

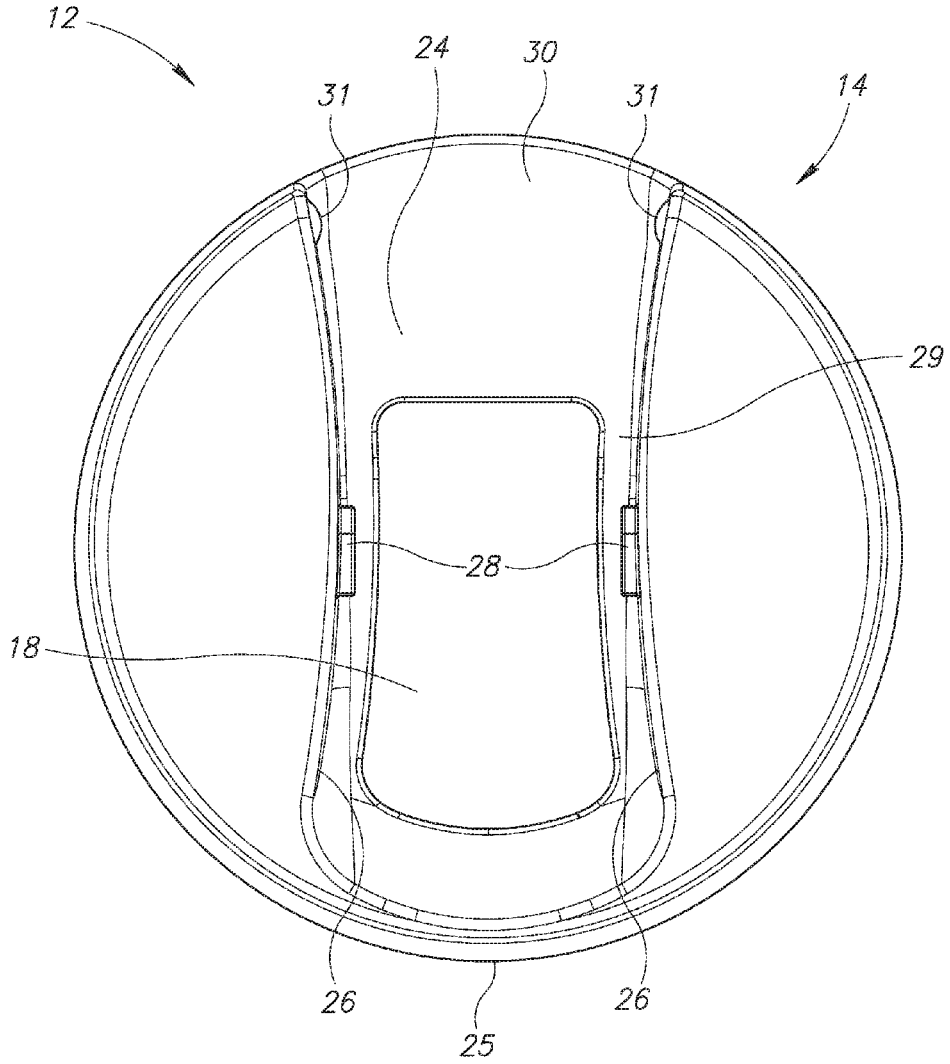


FIG.2C

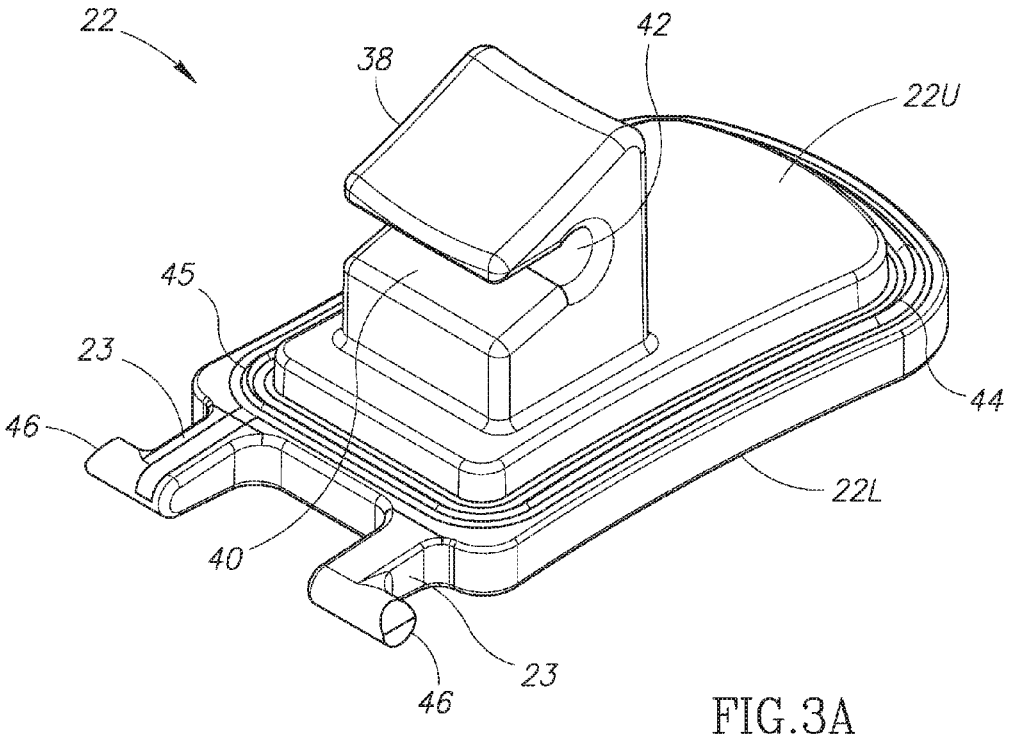


FIG.3A

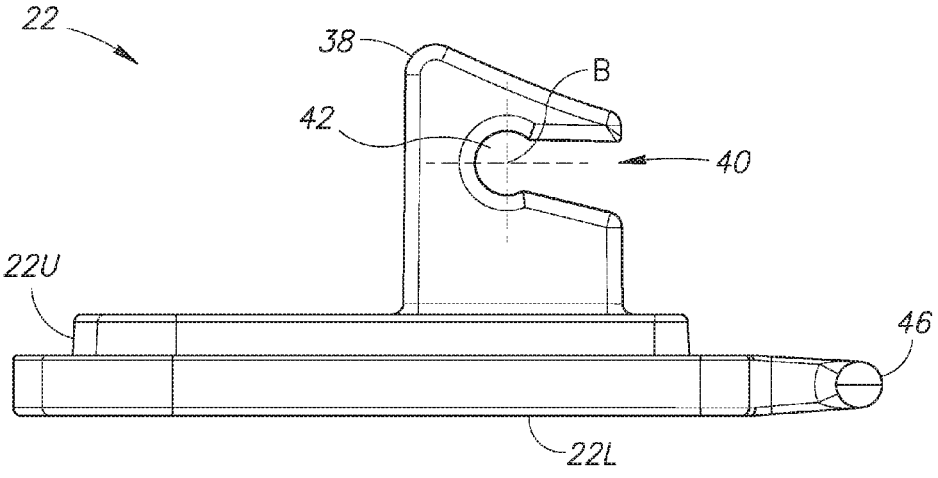


FIG.3B

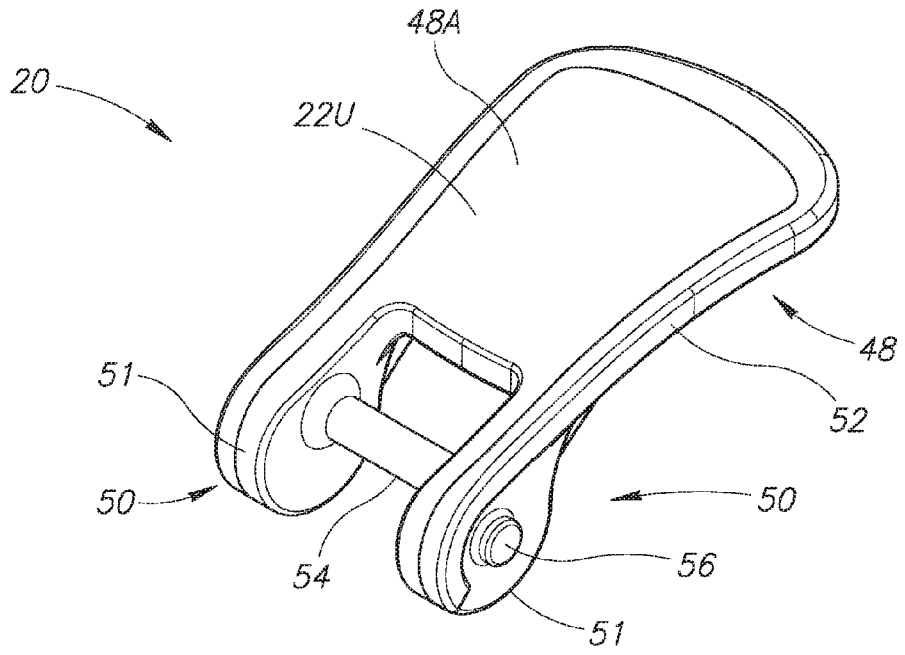


FIG.4A

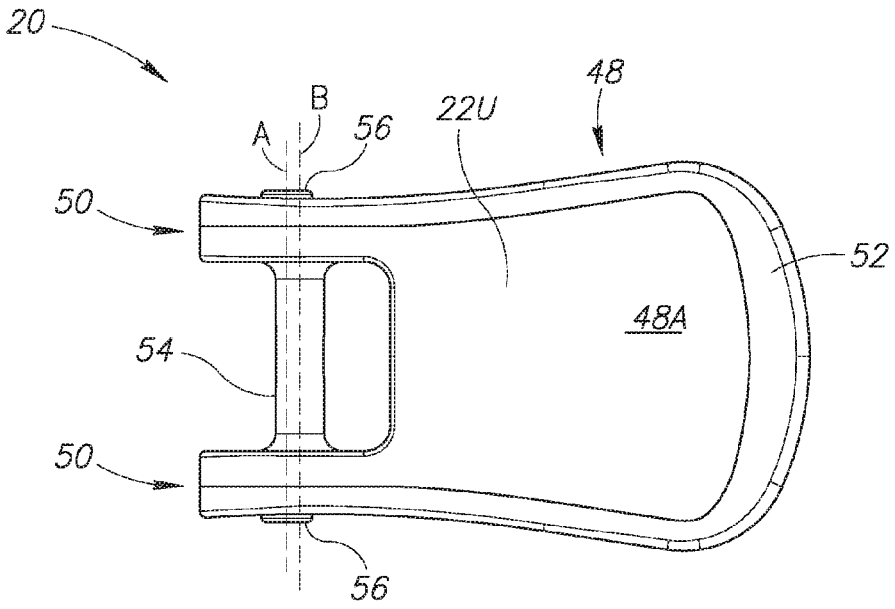


FIG.4B

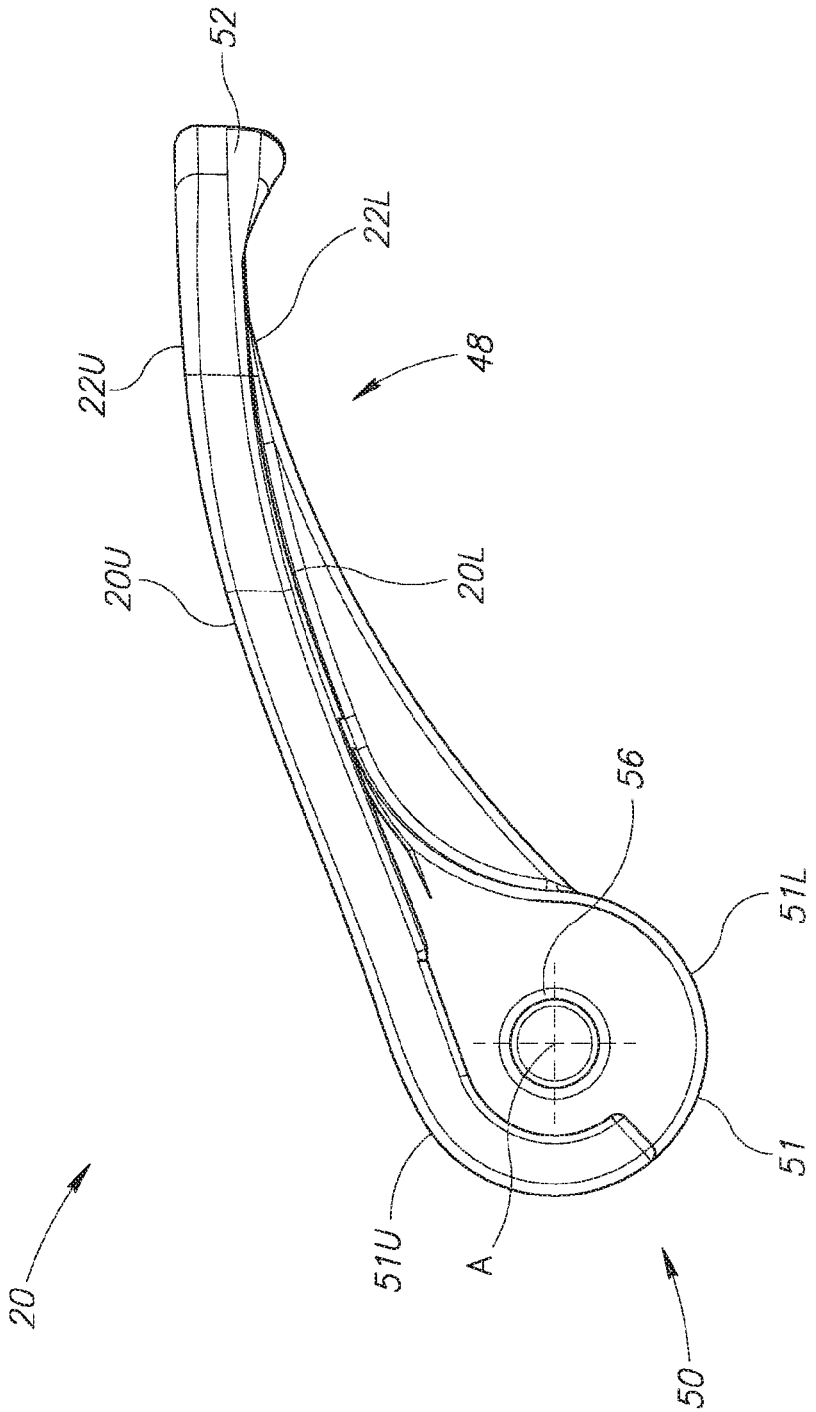


FIG.4C

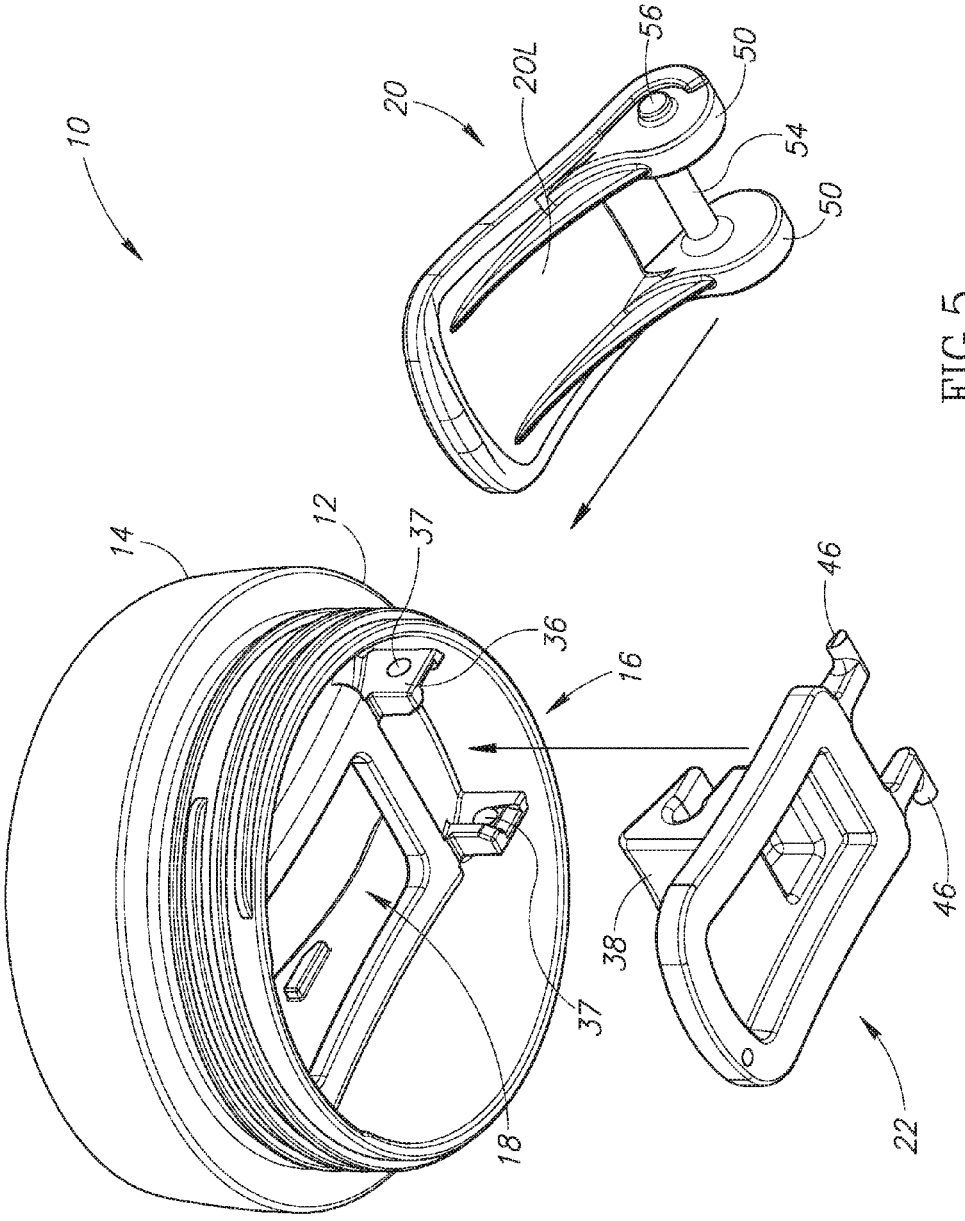
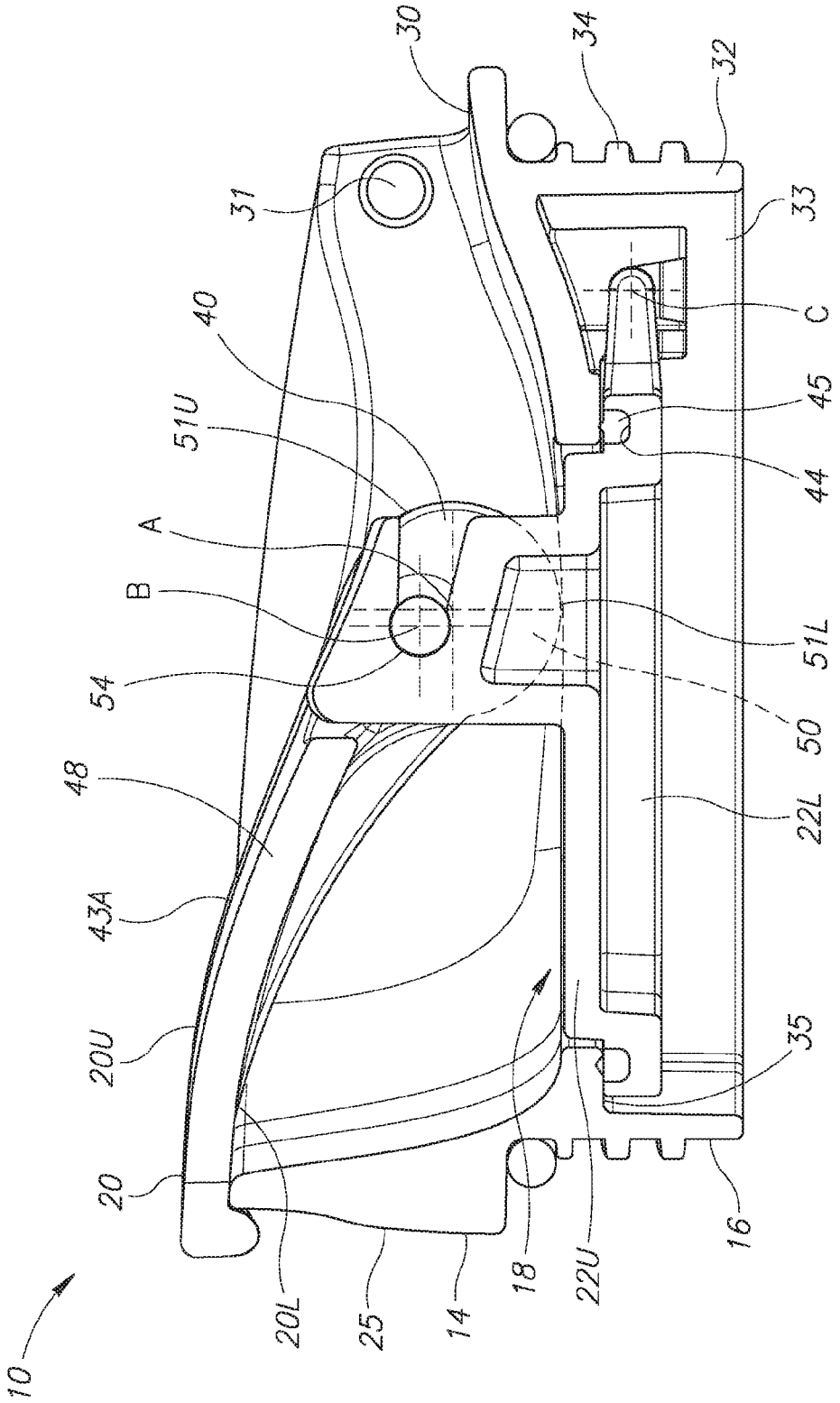


FIG.5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51U
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44
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18
22U

FIG.6A

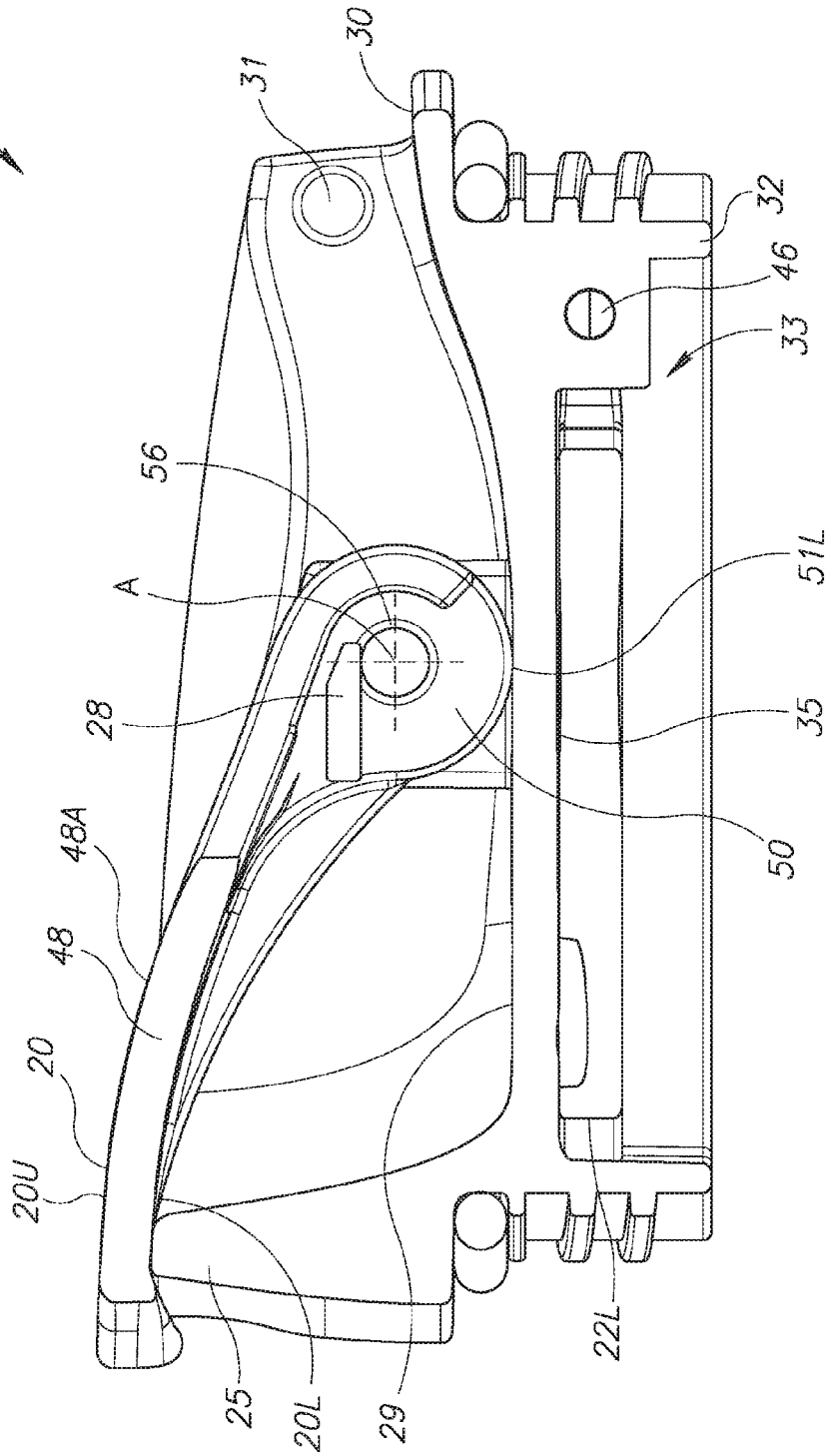
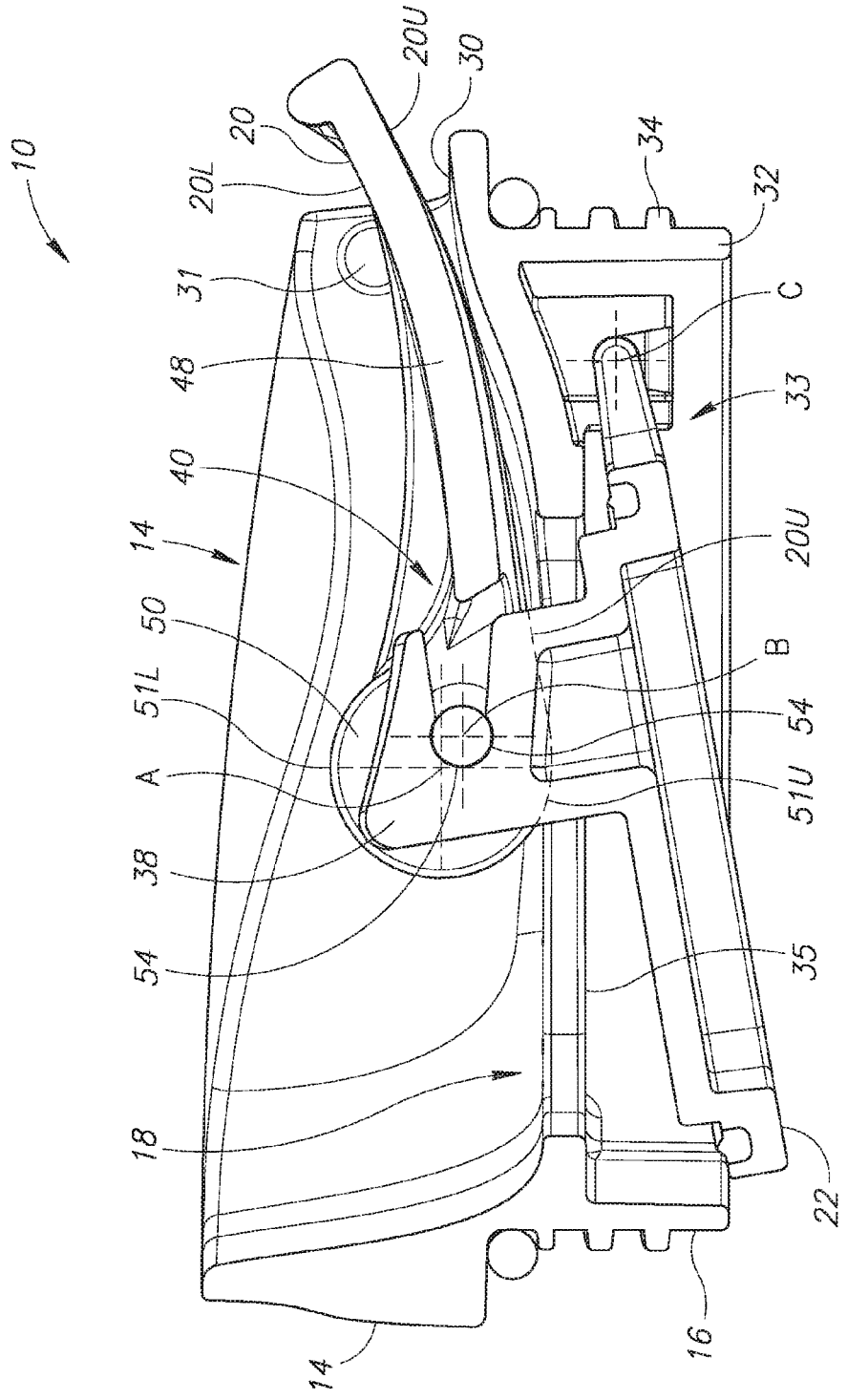


FIG.6B


10
20U
30
20
20L
34
32
31
C
48
33
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20U
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51L
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FIG. 7A

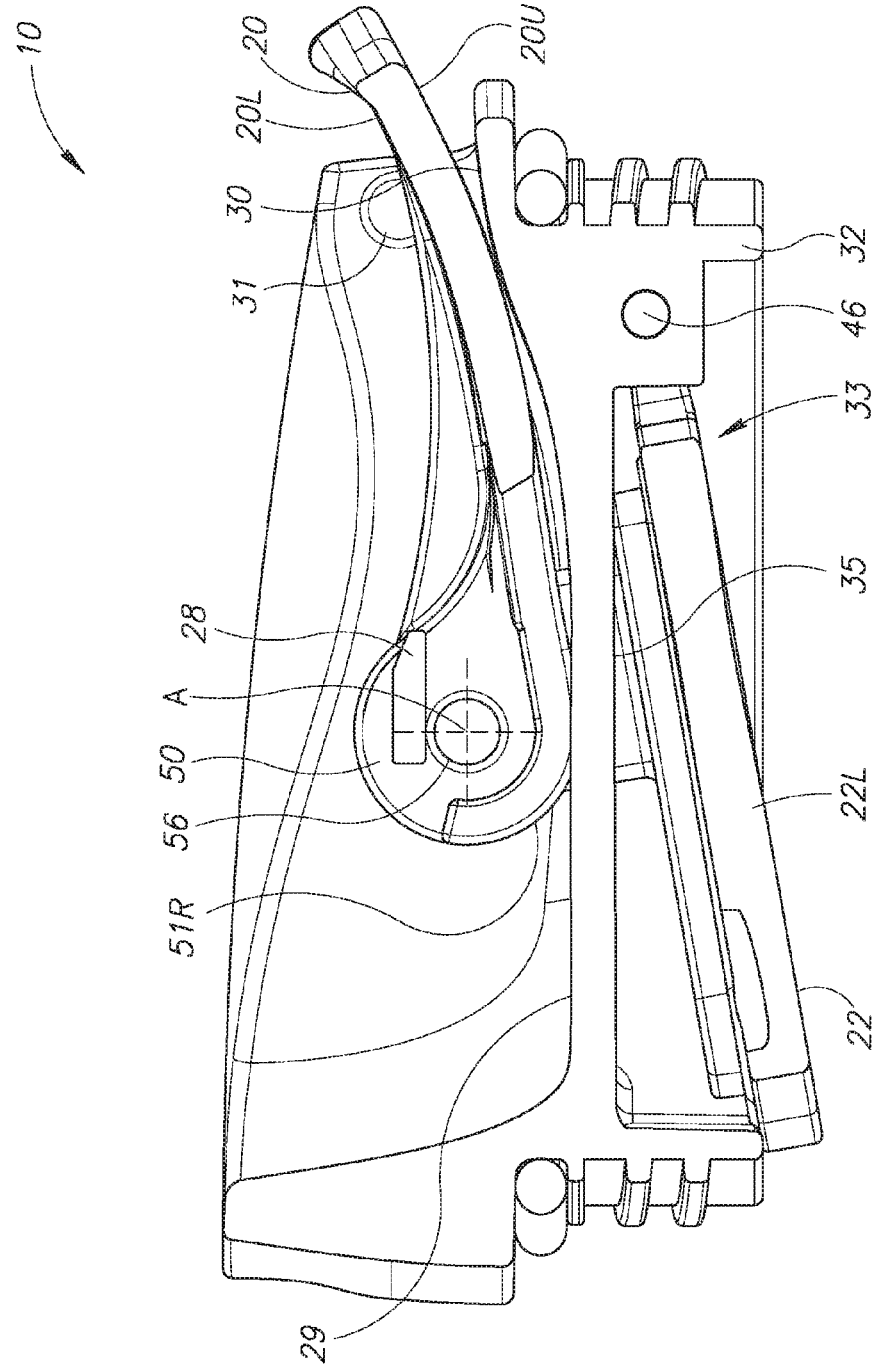

FIG. 7B

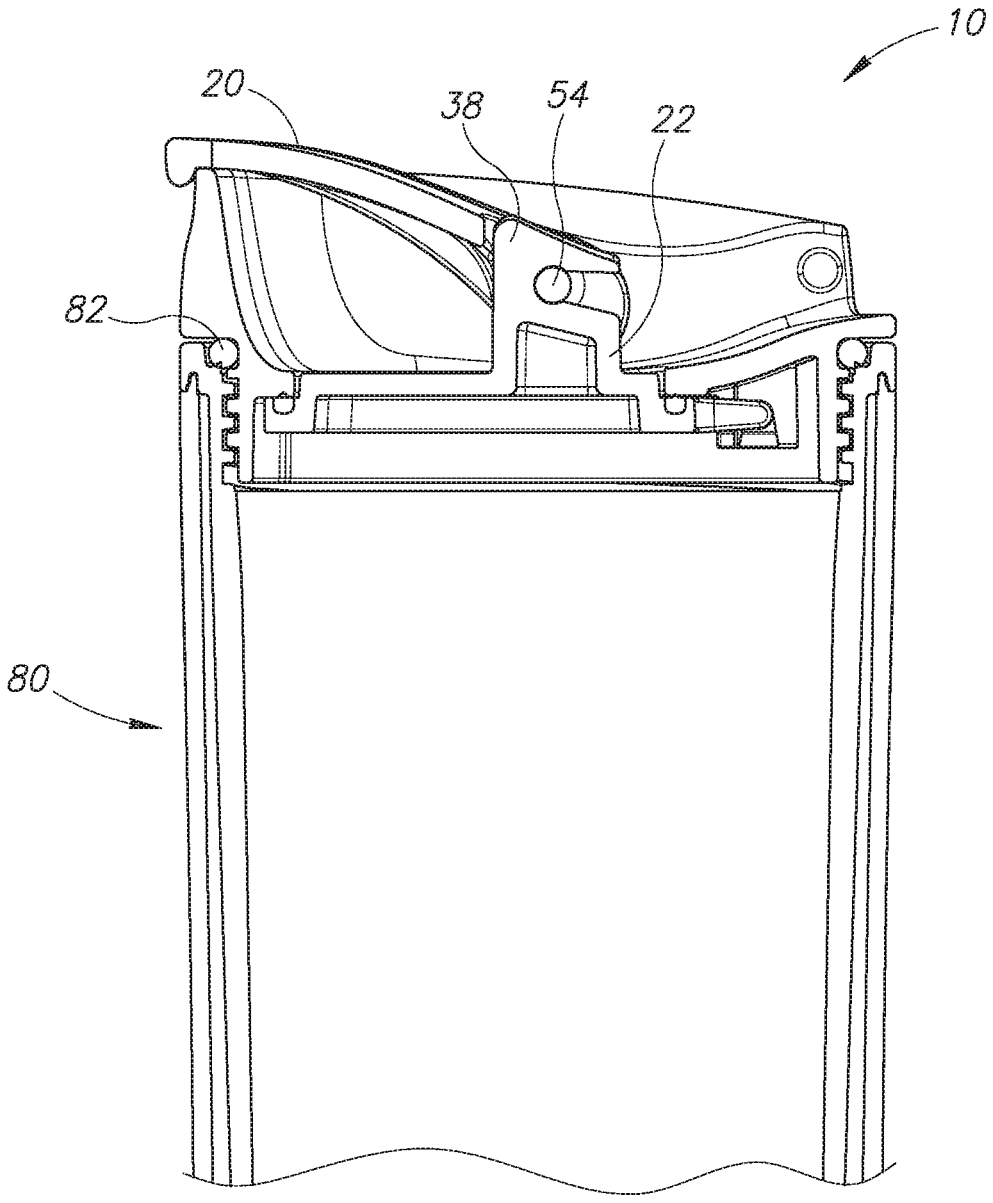

FIG.8

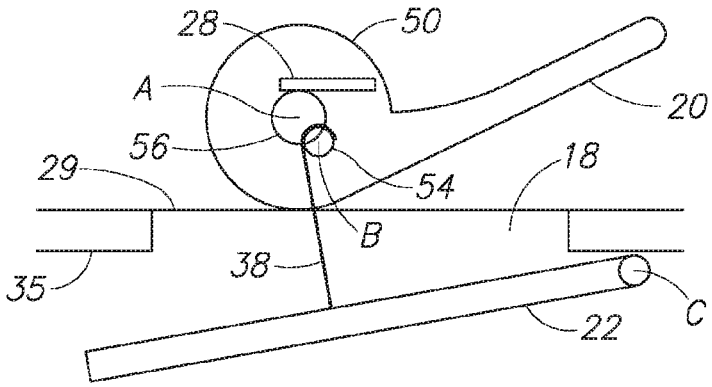

FIG.9A

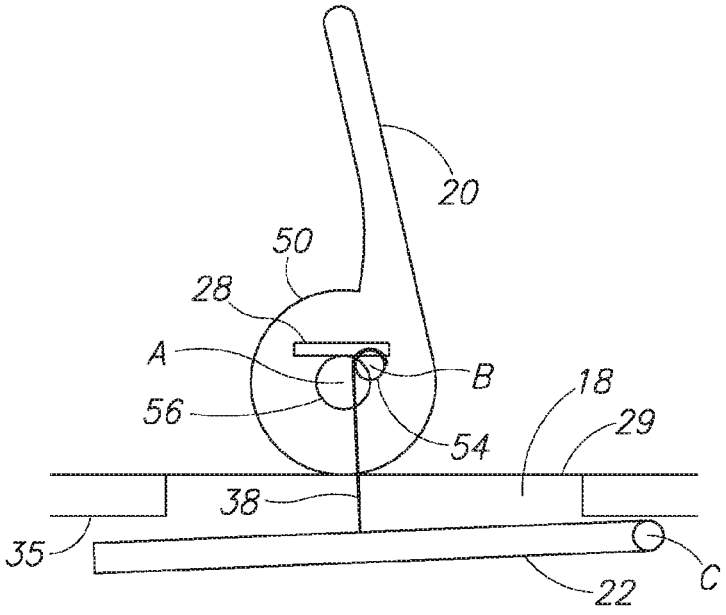

FIG.9B

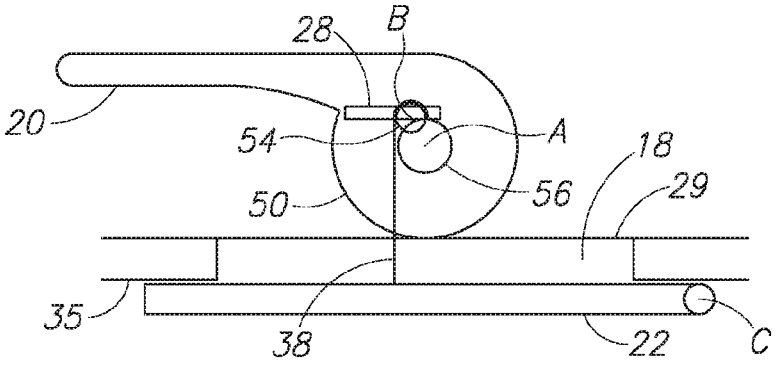

FIG.9C

CAM LID FOR DRINKING VESSEL

CROSS REFERENCE

[0001] The current application is a continuation of U.S. patent application Ser. No. 14/964,421 filed Dec. 9, 2015 which claims priority to U.S. Provisional Patent Application No. 62/133,234 filed Mar. 13, 2015, which is hereby incorporated by reference in its entirety.

FIELD OF INVENTION

[0002] The present invention relates to removable lids for drinking vessels and more precisely lids having camming mechanisms for sealing and unsealing a drinking aperture using a sealing element.

BACKGROUND

[0003] U.S. Patent Application Publication No. 2012/0031902 and U.S. Design Pat. D651,847 disclose a drinking container lid with a handle that rotates to selectively open and close a cover of the lid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. **1**A illustrates a top perspective view of a lid assembly for a drinking vessel in an unsealed configuration.

[0005] FIG. **1**B illustrates a top plan view of the lid assembly of FIG. **1**A in the unsealed configuration.

[0006] FIG. **1**C illustrates a top plan view of the lid assembly of FIG. **1**A in a sealed configuration.

[0007] FIG. **2**A illustrates a top perspective view of a lid main body of the lid assembly of FIG. **1**A.

[0008] FIG. **2**B illustrates a bottom perspective view of the lid main body of FIG. **2**A.

[0009] FIG. **2**C illustrates a top plan view of the lid main body of FIG. **2**A.

[0010] FIG. **3**A illustrates a top perspective view of a sealing member of the lid assembly of FIG. **1**A.

[0011] FIG. **3**B illustrates a side view of the sealing member of FIG. **3**A.

[0012] FIG. **4**A illustrates a top perspective view of a camming lever of the lid assembly of FIG. **1**A.

[0013] FIG. **4**B illustrates a top plan view of the camming lever of FIG. **4**A.

[0014] FIG. **4**C illustrates a side view of the camming lever of FIG. **4**A.

[0015] FIG. **5** illustrates an exploded view of the lid assembly of FIG. **1**A.

[0016] FIG. **6**A illustrates a first cross-sectional side view taken substantially along the line B**1**-B**1** of FIG. **1**C of the lid assembly of FIG. **1**A in the sealed configuration.

[0017] FIG. **6**B illustrates a second cross-sectional side view taken substantially along the line B**2**-B**2** of FIG. **1**C of the lid assembly of FIG. **1**A in the sealed configuration.

[0018] FIG. **7**A illustrates a first cross-sectional side view taken substantially along the line A**1**-A**1** of FIG. **1**B of the lid assembly of FIG. **1**A in the unsealed configuration.

[0019] FIG. **7**B illustrates a second cross-sectional side view taken substantially along the line A**2**-A**2** of FIG. **1**B of the lid assembly of FIG. **1**A in the unsealed configuration.

[0020] FIG. **8** illustrates a cross-sectional view of the lid assembly of FIG. **1**A attached to a drinking vessel.

[0021] FIG. **9**A is a schematic illustration of the lid assembly of FIG. **1**A in the unsealed configuration.

[0022] FIG. **9**B is a schematic illustration of the lid assembly of FIG. **1**A in a mid-position between the unsealed configuration of FIG. **9**A and the sealed configuration of FIG. **9**C.

[0023] FIG. **9**C is a schematic illustration of the lid assembly of FIG. **1**A in the sealed configuration.

DETAILED DESCRIPTION

[0024] A lid assembly **10** in accordance with the present embodiment is shown in FIG. **1**A. The lid assembly **10** has a substantially cylindrical lid main body **12** having an upper portion **14** and a lower portion **16**. The lid main body **12** includes an elongated drinking aperture **18** through which liquid may flow. A camming lever **20** is operable to selectively seal and unseal a sealing member **22** to close and open, respectively, the drinking aperture **18**. When the camming lever **20** is moved to a first position where a lower surface **20**L of the camming lever is proximate a forward upper surface portion of the upper portion **14**, the sealing member **22** is in a sealed position pressed against the drinking aperture **18**, as shown in FIGS. **1**C, **6**A and **6**B. When the camming lever **20** is moved to a second position where an upper surface **20**U of the camming lever is proximate a rearward portion of the upper portion **14**, as shown in FIGS. **1**A, **1**B, **7**A, and **7**B, the sealing member **22** is in an unsealed position spaced apart from and below the drinking aperture **18**.

[0025] The lid main body **12** may be provided with an elongated recess **24** that extends between a forward end and a rearward end along the upper portion **14**, as shown in FIGS. **2**A and **2**C. The elongated recess **24** terminates at a drinking lip **25** at the forward end, which projects upwardly from a forward end of the drinking aperture **18**. The elongated recess **24** includes left and right sidewalls **26** projecting upwardly above the drinking aperture **18** on opposite sides of the drinking aperture **18**. A stop or ledge **28** projects laterally inward from each of the left and right opposing sidewalls **26** near a center portion of the elongated recess **24**. The ledges **28** may have a length and profile extending along the center portion of the elongated recess. In an alternative embodiment the ledges **28** may be the upper elongated walls of slots formed in the sidewalls **26**. The lid main body **12** has a lid upper surface **29** extending around the drinking aperture **18** on an upper portion side of the lid main body **12**. The lid upper surface **29** may incline upward to an elevated portion **30** at the rearward end of the elongated recess **24** opposite to the drinking lip **25**, as shown in FIGS. **6**A, **6**B, **7**A, and **7**B. The lid main body **12** may have detents **31** that protrude inwardly from opposing sidewalls **26** near the rearward end of the elongated recess **24** opposite to the drinking lip **25**.

[0026] The lower portion **16** of the lid main body **12** may include a downwardly projecting circumferentially extending sidewall **32** to form a downwardly opening open-ended cavity **33**, as shown in FIGS. **2**B, **6**A, and **6**B. A lid lower surface **35** extends around the perimeter of the drinking aperture **18** on a lower portion side of the lid main body **12**. The sidewall **32** may be provided with a vessel attachment portion **34**, such as a thread portion that may threadably attached to a corresponding threaded portion of a drinking vessel **80**, as shown in FIG. **8**. The vessel attachment portion **34** may use other attachment features to removably join the lid assembly **10** to the drinking vessel **80** in a fluid-tight configuration, such as a bayonet mount or friction fit, and

may include an O-ring **82** or gasket sized to aid in sealing the lid assembly **10** to the drinking vessel **80**.

[0027] Referring to FIGS. **3**A and **3**B, the sealing member **22** has a sealing member upper portion **22**U that is sized and shaped to snuggly fit within the drinking aperture **18**. A lower portion **22**L of the sealing member **22** has a larger size than the upper portion **22**U to cover and seal the drinking aperture **18** from below by sealing engagement with the lid lower surface **35** of the lower portion **16** which extends around the perimeter of the drinking aperture. The lower portion **16** is provided with spaced-apart, downwardly projecting, sealing member attachment portions **36**, as shown in FIG. **2**B, to which the sealing member **22** is pivotally attached for rotational movement of the sealing member between sealed and unsealed positions with respect to the drinking aperture **18**. In the present embodiment, the sealing member attachment portions **36** each include an aperture **37** which rotatably receive therein one of two laterally outward extending pivot pins **46** of the sealing member **22**. Each of the pivot pins **46** is attached to a rearward end of an arm **23** which projects rearwardly from the lower portion **22**L of the sealing member **22**. The sealing member attachment portions **36** and the sealing member **22** may instead be constructed in other manners to provide rotational attachment of the sealing member **22** to the lid main body **12**.

[0028] An axle attachment element **38** (connector member) of the sealing member **22** projects upwardly from the sealing member upper portion **22**U. An axle insertion opening **40** is provided on the axle attachment element **38** for receiving a cam axle **54** of the camming lever **20** therethough for assembly of the camming lever and the sealing member. The axle insertion opening **40** has a tapered mouth portion to facilitate easy insertion of the cam axle **54** during assembly with the sealing member **22** (see FIGS. **3**A, **3**B, **6**A and **7**A). The axle insertion opening **40** leads to a transversely oriented axle attachment chamber **42** that is sized and shaped to removably receive and securely rotatably retain the cam axle **54** of the camming lever **20** therein in a snap-fit relationship allowing the camming lever to rotate when a rotational force is applied to the camming lever by a user. The lower portion **22**L of the sealing member **22** may have an upward facing surface portion **44** extending about the upper portion **22**U which supports an elastically deformable gasket **45** that forms a fluid-tight seal with the lid lower surface **35** of the lower portion **16** of the lid main body **12** which extends around the perimeter of the drinking aperture **18** when the sealing member is in the sealed position.

[0029] The camming lever **20** has two generally circular cam lobes **50** disposed on an end of a lever arm **48**, as shown in FIGS. **4**A-**4**C. In the present embodiment, the lever arm **48** has a curved shape along its length. In some embodiments, the lever arm **48** may instead have a straight shape. The cam lobes **50** each have a rounded cam engagement surface **51** on an outer peripheral edge of the cam lobe **50**. Each cam engagement surface **51** has an interface upper portion **51**U and an interface lower portion **51**L, as shown in FIG. **4**C. In the present embodiment, the lever arm **48** has a wide body portion **48**A that extends over and shields the drinking aperture **18** when the sealing member **22** is in the sealed position with the drinking aperture closed, as shown in FIG. **6**A, serving as a cover for the drinking aperture. The detents **31** of the lid main body **12** may contact the sides of the wide body portion of the lever arm **48** to help retain the camming lever **20** in place when in the unsealed position with the drinking aperture **18** open, as shown in FIGS. **7**A and **7**B. In some embodiments, the lever arm **48** may have a different shape, such as a narrow shaft or shafts projecting from the cam lobes **50**. A soft over-mold **52** may be provided around all or part of a peripheral edge of the lever arm **48** to help prevent abrasion between the lever arm and the lid main body **12**.

[0030] The cam axle **54** is cylindrical in cross-section and extends between and connects together the inwardly facing sides of the cam lobes **50**. A stub axle **56** (stop member portion) projects from the outwardly facing side of each of the cam lobes **50**. The stub axels **56** are both located on a center axis A as shown in FIGS. **4**C, **6**A and **6**B. The cam axle **54** is located on a center axis B about which the camming lever **20** rotates relative the sealing member **22**. Axis A of the stub axles **56** is substantially parallel to but offset from the axis B of the cam axle **54** and the sealing member **22**. Axis B is coaxial with the axis of the axis attachment chamber **42** of the sealing member **22**. When the cam lever **20** is moved to the first position as shown in FIG. **6**A, the axis B of the cam axle **54** is forward of and above axis A of the stub axles **56** (shown schematically in FIG. **9**C). When the cam lever **20** is moved to the second position as shown in FIG. **7**A, the axis B of the cam axle **54** is rearward of and below axis A of the stub axles **56** (shown schematically in FIG. **9**A). Throughout the movement of the cam lever **20** between the first and second positions of the cam lever, the stub axles **56** are in one or both of sliding and rolling engagement with the lower sides or surfaces of the ledges **28** which limit upward movement of the stub axles, hence the axis A of the stub axles remains at substantially the same distance above the lid upper surface **29** while rotation of the cam lever **20** causes raising and lowering as well as forward and rearward movement of the axis B of the cam axle **54** which produces raising and lowering of the sealing member **22** to which the cam axle is rotatably attached. As the cam lever **20** is rotated the stub axles **56** are free to slide and roll forward and rearward along the lower surfaces of the ledges **28**.

[0031] Assembly of the lid assembly **10** is described with reference to FIG. **5**. First, with the axle attachment element **38** oriented toward the drinking aperture **18**, the arms **23** of the lower portion **22**L of the sealing member **22** are flexed inwardly and then positioned between the sealing member attachment portions **36** on the lower portion **16** of the lid main body **12** so as to position the free ends of each of the pivot pins **46** for entry into one the corresponding aperture **37** of the sealing member attachment portions **36**. The arms **23** are resilient and when released they move outward and insert the pivot pins **46** within the apertures **37** for rotatable attachment of the sealing member **22** to the lid main body **12** for rotation of the sealing member relative to the lid main body about an axis C, shown in FIGS. **6**A and **7**A, centered on the apertures **37** of the sealing member attachment portions **36**. In such manner, the sealing member **22** is movable relative to the lid main body **12** along a circular arcuate rotational path centered on the axis C as the sealing member is rotated between the sealed and unsealed positions by rotation of the camming lever **20** between its first and second positions, respectively.

[0032] Second, the sealing member **22** is rotated to position the upper portion **22**U of the sealing member **22** within the drinking aperture **18** such that the axle attachment

element **38** extends upward through the drinking aperture and into the elongated recess **24** of the lid main body **12**.

[0033] Third, the cam axle **54** of the camming lever **20** is inserted into the mouth of the axle insertion opening **40** of the sealing member **22** and snap-fitted into the axle attachment chamber **42** with the stub axles **56** positioned below the corresponding ones of the ledges **28** projection inward from the sidewalls **26** of the elongated recess **24**. The ledges **28** are sized to act as stops engaged by the stub axles **56** to limit upward movement of the camming lever **20** when rotated between its first and second positions. However, the stub axles **56** are free to slide and roll along the lower surfaces of the ledges **28**. The camming lever **20** is retained by the lid assembly **10** via its attachment to the sealing member **22** rather than being directly attached to the lid main body **12**. The cam axle **54** may freely rotate within the axle attachment chamber **42** relative to the lid main body **12**. The lid assembly **10** being fully assembled, the camming lever **20** may be rotated back and forth between its first and second positions (i.e., between the detents **31** and the drinking lip **25**) to selectively transition the lid assembly between a sealed configuration and an unsealed configuration, as described below.

[0034] When the lid assembly **10** is in the sealed configuration, the sealing member **22** is in the sealed position sealing the drinking aperture **18** of the lid main body **12**, as shown in FIG. **6**A (cross-sectional view along line A**1**-A**1**). The lever arm **48** of the camming lever **20** is positioned toward the drinking lip **25** of the lid main body **12** and extends above and covers the drinking aperture **18** shielding the drink aperture and the portion of the sealing member **22** sealing the drink aperture. The lower surface **20**L of the camming lever **20** faces downward toward the lid upper surface **29**. The interface lower portion **51**L of the cam engagement surface **51** of each cam lobe **50** contacts the portion of the lid upper surface **29** therebelow, as shown in FIG. **6**B (cross-sectional view along line A**2**-A**2**). The stub axles **56** of the cam lobes **50** each contact a lower surface of one of the ledges **28** thereabove. When in the sealing position the cam lobes **50** are in sliding engagement with the lid upper surface **29** simultaneous with the stub axles **56** being in sliding engagement with the lower surface of the ledges **28**. When the camming lever **20** is in this position, the camming lever is in its first position and the cam axle **54** is centered along axis B at a position sufficiently above the interface lower portion **51**L and the lid upper surface **29** that the sealing member **22** through its rotatable attachment to the cam axle is held with the lower portion **22**L thereof sealing the drinking aperture **18**. That is, the axis B along which cam axle **54** is centered is offset forward and above the axis A of the cam lobes **50**. The cam axle **54** positions the axle attachment element **38** in a raised position above the lid upper surface **29** holding the sealing member upper portion **22**U in a close-fit within the drinking aperture **18**. The sealing member lower portion **22**L is tightly pressed against the lid lower surface **35** to form a fluid-tight seal, helping to retain heat and liquid within the drinking vessel **80** when the lid assembly **10** is attached thereto. Equipping the sealing member **20** with the elastically deformable gasket **45** on the upward facing surface portion of the lower portion **22**L of the sealing member further aids in creating the fluid-tight seal.

[0035] When the lid assembly **10** is in the unsealed configuration, the sealing member **22** is in the unsealed position spaced apart from and below the lid lower surface **35** of the lower portion **16** of the lid main body **12**, thus opening the drinking aperture **18**, as shown in FIG. **7**A (cross-sectional view along line B**1**-B**1**) and FIG. **7**B (cross-sectional view along line B**2**-B**2**). The lever arm **48** of the camming lever **20** is positioned toward the elevated portion **30** at the rearward end of the elongated recess **24** of the lid main body **12**. When the lever arm **48** of the camming lever **20** is in this position, the detents **31** help to retain the camming lever in its second position with the sealing member **22** in the unsealed position. The upper surface **20**U of the camming lever **20** faces the elevated portion **30** of the lid main body **12**. The interface upper portion **51**U of each cam lobe **50** is in sliding engagement with or positioned slightly above the lid upper surface **29**. The stub axles **56** of the cam lobes **50** each contact the lower surface of one of the ledges **28** thereabove and are in sliding engagement therewith. The cam axle **54** is centered along axis along axis B at a position sufficiently close to the lid upper surface **29** that the sealing member **22** through its rotatable attachment to the cam axle is held low enough that the lower portion **22**L thereof is spaced away from and below the drinking aperture **18** allowing liquid from the drinking vessel **80** to flow through the drinking aperture when the lid assembly **10** is attached thereto.

[0036] The movement of the cam lever **20** back and forth between the first and second positions, and respectively, the resulting movement of the sealing member **22** back and forth between sealed and unsealed positions sealing and unsealing the drinking aperture **18**, as described above, are shown schematically if FIGS. **9**A-**9**C. In FIG. **9**A the lid assembly is shown schematically with the cam lever **20** in the second position with the sealing member **22** in the unsealed position and the drinking aperture **18** open allowing liquid from the drinking vessel **80** to flow through the drinking aperture when the lid assembly **10** is attached thereto. In the second position of the cam lever **20** the axis B of the cam axle **54** is rearward of and below axis A of the stub axles **56** (see FIGS. **7**A and **9**A), as viewed from the side of the lid assembly **10**.

[0037] Rotation of the cam lever **20** in the counterclockwise direction from the second position toward the first position (movement from the position in FIG. **9**A toward the mid-position in FIG. **9**B) causes the stub axles **56** to rotate counterclockwise and roll rearward along the lower surfaces of the ledges **28**. At the same time this movement causes the axis B of the of the cam axle **54** to move upward and lift the sealing member **22** upward by applying a lifting force thereon through the axle attachment element **38** (shown schematically as a straight line in FIGS. **9**A-**9**C) of the sealing member to move the sealing member upper portion **22**U upward toward engagement with the lid lower surface **35** surrounding the drinking aperture **18**.

[0038] Further counterclockwise rotation of the cam lever **20** from the mid-position shown in FIG. **9**B to the first position shown in FIG. **9**C causes the stub axles **56** to continue rotating counterclockwise and roll further rearward along the lower surfaces of the ledges **28**. At the same time this movement causes further upward movement of the axis B of the of the cam axle **54** to move upward and lift the sealing member **22** upward by applying a lifting force thereon through the axle attachment element **38** of the sealing member to move the sealing member upper portion **22**U into sealing engagement with the lid lower surface **35**

surrounding the drinking aperture **18**. At the same time, the movement causes the axis B of the cam axle **54** to move forward and pass over the axis A of the stub axles **56** providing a cam over center movement which, when the cam lever **20** is in the first position of FIG. **9**C, tends to resist unintentional clockwise rotation of the cam lever center and hold the sealing member upper portion **22**U in fluid-tight sealing engagement with the lid lower surface **35**.

[0039] The motions described are reversed when the cam lever **20** is moved from the first position to the second position.

[0040] While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that, based upon the teachings herein, changes and modifications may be made without departing from this invention and its broader aspects and, therefore, the appended claims are to encompass within their scope all such changes and modifications as are within the true spirit and scope of this invention. Furthermore, it is to be understood that the invention is solely defined by the appended claims. It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the term "including" should be interpreted as "including but not limited to," the term "having" should be interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited to," etc.).

[0041] It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases "at least one" and "one or more" to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim recitation to inventions containing only one such recitation, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an" (e.g., "a" and/or "an" should typically be interpreted to mean "at least one" or "one or more"); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly recited, those skilled in the art will recognize that such recitation should typically be interpreted to mean at least the recited number (e.g., the bare recitation of "two recitations," without other modifiers, typically means at least two recitations, or two or more recitations). Accordingly, the invention is not limited except as by the appended claims.

1. A lid assembly for a drinking vessel, comprising:

a lid main body having a lid portion with a drinking aperture and a pair of spaced apart stop portions positioned above the drinking aperture;

a sealing member having a sealing portion and an axle attachment portion, the sealing portion being positioned below the drinking aperture and sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture, the axle attachment portion being attached to an upper side of the sealing portion and extending upward through the drinking aperture; and

a camming lever having a cam arm attached to a pair of laterally spaced apart cams to rotate the cams in response to rotation of the cam arm, a laterally extending cam axle positioned between and attached to each of the cams, and a stub axle extending laterally outward from each of the cams, the cams being positioned to engage the lid portion and the stub axles each being positioned to engage a corresponding one of the stop portions of the lid main body to limit upward movement of the stub axles while permitting at least limited forward and rearward movement of the stub axles, the cam axle being in pivotal engagement with the axle attachment portion of the sealing member, the cam arm having a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position.

2. The lid assembly of claim **1** wherein the stub axles have a common first axis and the cam axle has a second axis, with the first and second rotational axes being out of coaxial alignment.

3. The lid assembly of claim **2** wherein when the cam arm is in the first rotational position the second axis of the cam axle is located above and forward of the first axis of the stub axles, and when the cam arm is in the second rotational position the second axis of the cam axle is located below and rearward of the first axis of the stub axles.

4. The lid assembly of claim **3** wherein the camming lever is configured such that as the cam arm is moved between the first and second rotational positions the second axis of the cam axle follows a path passing over the first axis of the stub axles.

5. The lid assembly of claim **2** wherein the sealing member is pivotally attached to the lid main body for rotation about a third axis out of coaxial alignment with both the first and second axes of the stub axles and the cam axle.

6. The lid assembly of claim **1** wherein the lid main body further includes a upwardly facing recess in fluid communication with the drinking aperture and having a drinking lip at a forward end of the recess projecting upward above the drinking aperture, the recess having first and second sidewalls positioned on opposite sides of the drinking aperture, one of the stop portions being attached to and projecting laterally inward from the first sidewall and the other of the stop portions being attached to and projecting laterally inward from the second sidewall.

7. The lid assembly of claim **6** wherein the cam arm when in the first rotational position extends over the drinking aperture, thereby shielding the drinking aperture.

8. The lid assembly of claim **1** wherein the cams comprise first and second cams, each have a rounded cam peripheral edge wall portion which engages the lid portion, one of the stub axles being attached to the first cam at a central location of the first cam and the other of the stub axles being attached to the second cam at a location a central location of the second cam, the cam axle having first and second ends, the first end of the cam axle being attached to the first cam at a

location offset from the central location of the first cam and the second end of the cam axle being attached to the second cam at a location offset from the central location of the second cam.

9. A lid assembly for a drinking vessel, comprising:

a lid main body having a left and right lid portions with a drinking aperture located therebetween and spaced apart left and right stop portions positioned above the drinking aperture, the left stop portion being located to the left of the drinking aperture and the right stop portion being located to the right of the drinking aperture;

a sealing member having a sealing portion and an axle attachment portion, the sealing portion being positioned below the drinking aperture and sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture, the axle attachment portion being attached to an upper side of the sealing portion and extending upward through the drinking aperture; and

a camming lever having a cam arm attached to a pair of laterally spaced apart left and right cams to rotate the left and right cams in response to rotation of the cam arm, a laterally extending cam axle positioned between and attached to both of the left and right cams, a left stub axle extending laterally outward from the left cam and a right stub axle extending laterally outward from the right cam, the left cam being positioned to engage the left lid portion and the right cam being positioned to engage the right lid portion, the left stub axle being positioned to engage the left stop portion of the lid main body to limit upward movement of the left stub axle without limiting forward and rearward movement of the left stub axle and the right stub axle being positioned to engage the right stop portion of the lid main body to limit upward movement of the right stub axle while permitting at least limited forward and rearward movement of the right stub axle, the cam axle being in pivotal engagement with the axle attachment portion of the sealing member, the cam arm having a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position.

10. The lid assembly of claim **9** wherein the left and right stub axles have a common first axis and the cam axle has a second axis, with the first and second axes being out of coaxial alignment.

11. The lid assembly of claim **10** wherein when the cam arm is in the first rotational position the second axis of the cam axle is located above and forward of the first axis of the stub axles, and when the cam arm is in the second rotational position the second axis of the cam axle is located below and rearward of the first axis of the stub axles.

12. The lid assembly of claim **11** wherein the camming lever is configured such that as the cam arm is moved between the first and second rotational positions the second axis of the cam axle follows a path passing over the first axis of the stub axles.

13. The lid assembly of claim **10** wherein the sealing member is pivotally attached to the lid main body for rotation about a third axis out of coaxial alignment with both the first and second axes of the stub axles and the cam axle.

14. The lid assembly of claim **9** wherein the lid main body further includes a upwardly facing recess in fluid communication with the drinking aperture and having a drinking lip at a forward end of the recess projecting upward above the drinking aperture, the recess having left and right sidewalls positioned on opposite sides of the drinking aperture, the left stop portion being attached to and projecting laterally inward from the left sidewall and the right stop portion being attached to and projecting laterally inward from the right sidewall.

15. The lid assembly of claim **14** wherein the cam arm when in the first rotational position extends over the drinking aperture, thereby shielding the drinking aperture.

16. The lid assembly of claim **9** wherein the left cam has a rounded cam peripheral edge wall portion which engages the left lid portion, the right cam has a rounded cam peripheral edge wall portion which engages the right lid portion, the left stub axle being attached to the left cam at a central location of the left cam, the right stub axle being attached to the right cam at a central location of the right cam, the cam axle having left and right ends, the left end of the cam axle being attached to the left cam at a location offset from the central location of the left cam and the right end of the cam axle being attached to the right cam at a location offset from the central location of the right cam.

17. A lid assembly for a drinking vessel, comprising:

a lid main body having a lid portion with a drinking aperture and a pair of spaced apart stop portions;

a sealing member having a sealing portion sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture;

a camming lever having a cam arm attached to a pair of laterally spaced apart cams to rotate the cams in response to rotation of the cam arm, a laterally extending cam axle positioned between the cams and a stub axle extending laterally outward from each of the cams, the cams being positioned to engage the lid portion and the stub axles each being positioned to engage one of the stop portions of the lid main body to limit upward movement of the stub axles while permitting at least limited forward and rearward movement of the stub axles; and

a connector member extending between and connected to the sealing member and the cam axle, wherein the cam arm has a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position.

18. The lid assembly of claim **17** wherein the sealing portion is positioned below the drinking aperture and the connector member extends upward from the sealing portion through the drinking aperture.

19. The lid assembly of claim **17** wherein the connector member is pivotally connected to the cam axle.

20. The lid assembly of claim **19** wherein the connector member is rigidly connected to the sealing member.

21. The lid assembly of claim **17** wherein the stub axles have a common first axis and the cam axle has a second axis, with the first and second axes being out of coaxial alignment.

22. The lid assembly of claim **21** wherein when the cam arm is in the first rotational position the second axis of the cam axle is located above and forward of the first axis of the stub axles, and when the cam arm is in the second rotational position the second axis of the cam axle is located below and rearward of the first axis of the stub axles.

23. The lid assembly of claim **22** wherein the camming lever is configured such that as the cam arm is moved between the first and second rotational positions the second axis of the cam axle follows a path passing over the first axis of the stub axles.

24. The lid assembly of claim **21** wherein the sealing member is pivotally attached to the lid main body for rotation about a third axis out of coaxial alignment with both the first and second axes of the stub axles and the cam axle.

25. The lid assembly of claim **17** wherein the lid main body further includes a upwardly facing recess in fluid communication with the drinking aperture and having a drinking lip at a forward end of the recess projecting upward above the drinking aperture, the recess having first and second sidewalls positioned on opposite sides of the drinking aperture, one of the stop portions being attached to and projecting laterally inward from the first sidewall and the other of the stop portions being attached to and projecting laterally inward from the second sidewall.

26. The lid assembly of claim **25** wherein the cam arm when in the first rotational position extends over the drinking aperture, thereby shielding the drinking aperture.

27. The lid assembly of claim **17** wherein the cams comprise first and second cams, each have a rounded cam peripheral edge wall portion which engages the lid portion, one of the stub axles being attached to the first cam at a central location of the first cam and the other of the stub axles being attached to the second cam at a central location of the second cam, the cam axle having first and second ends, the first end of the cam axle being attached to the first cam at a location offset from the central location of the first cam and the second end of the cam axle being attached to the second cam at a location offset from the central location of the second cam.

28. A lid assembly for a drinking vessel, comprising:

a lid main body having a lid portion with a drinking aperture;

a sealing member having a sealing portion sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture;

a camming lever having a cam arm attached to a pair of laterally spaced apart cams to rotate the cams in response to rotation of the cam arm, a laterally extending cam axle positioned between the cams, the cams being positioned to engage the lid portion and restrained to limit upward movement of the cams while permitting at least limited forward and rearward movement of the cams; and

a connector member extending between and connected to the sealing member and the cam axle, wherein the cam arm has a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position.

29. The lid assembly of claim **28** wherein the sealing portion is positioned below the drinking aperture and the connector member extends upward from the sealing portion through the drinking aperture.

30. The lid assembly of claim **28** wherein the connector member is pivotally connected to the cam axle.

31. The lid assembly of claim **30** wherein the connector member is rigidly connected to the sealing member.

32. The lid assembly of claim **28** wherein rotation of the cam arm rotates the cams about a common first axis and the cam axle has a second axis, with the first and second axes being out of coaxial alignment.

33. The lid assembly of claim **32** wherein when the cam arm is in the first rotational position the second axis of the cam axle is located above and forward of the first axis of the cams, and when the cam arm is in the second rotational position the second axis of the cam axle is located below and rearward of the first axis of the cams.

34. The lid assembly of claim **33** wherein the camming lever is configured such that as the cam arm is moved between the first and second rotational positions the second axis of the cam axle follows a path passing over the first axis of the cams.

35. The lid assembly of claim **32** wherein the sealing member is pivotally attached to the lid main body for rotation about a third axis out of coaxial alignment with both the first and second axes of the cams and the cam axle.

36. The lid assembly of claim **28** wherein the cam arm when in the first rotational position extends over the drinking aperture, thereby shielding the drinking aperture.

37. A lid assembly for a drinking vessel, comprising:

a lid main body having a lid portion with a drinking aperture and a stop portion;

a sealing member having a sealing portion sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture;

a camming lever having a cam arm attached to a cam to rotate the cam in response to rotation of the cam arm, a laterally extending cam axle attached to the cam and a laterally extending stop member portion attached to the cam out of coaxial alignment with the cam axle, the cam being positioned to engage the lid portion and the stop member portion being positioned to engage the stop portion of the lid main body to limit upward movement of the cam while permitting at least limited forward and rearward movement of the cam; and

a connector member extending between and connected to the sealing member and the cam axle, wherein the cam arm has a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second

rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position.

38. The lid assembly of claim **37** wherein the sealing portion is positioned below the drinking aperture and the connector member extends upward from the sealing portion through the drinking aperture.

39. The lid assembly of claim **37** wherein the connector member is pivotally connected to the cam axle.

40. The lid assembly of claim **39** wherein the connector member is rigidly connected to the sealing member.

41. The lid assembly of claim **37** wherein the stop member portion has a first axis and the cam axle has a second axis, with the first and second axes being out of coaxial alignment.

42. The lid assembly of claim **41** wherein when the cam arm is in the first rotational position the second axis of the cam axle is located above and forward of the first axis of the stop member portion, and when the cam arm is in the second rotational position the second axis of the cam axle is located below and rearward of the first axis of the stop member portion.

43. The lid assembly of claim **42** wherein the camming lever is configured such that as the cam arm is moved between the first and second rotational positions the second axis of the cam axle follows a path passing over the first axis of the stop member portion.

44. The lid assembly of claim **41** wherein the sealing member is pivotally attached to the lid main body for rotation about a third axis out of coaxial alignment with both the first and second axes of the stop member portion and the cam axle.

45. The lid assembly of claim **37** wherein the lid main body further includes a upwardly facing recess in fluid communication with the drinking aperture and having a drinking lip at a forward end of the recess projecting upward above the drinking aperture, the recess having first and second sidewalls positioned on opposite sides of the drinking aperture, the stop portion being attached to and projecting laterally inward from the first sidewall.

46. The lid assembly of claim **45** wherein the cam arm when in the first rotational position extends over the drinking aperture, thereby shielding the drinking aperture.

47. The lid assembly of claim **37** wherein the cam has a rounded cam peripheral edge wall portion which engages the lid portion, the stop member portion being attached to the cam at a central location of the cam, and the cam axle being attached to the cam at a location offset from the central location of the cam.

48. A lid assembly for a drinking vessel, comprising:

a lid main body having a lid portion with a drinking aperture;

a sealing member having a sealing portion sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture;

a camming lever having a cam arm attached to a cam to rotate the cam in response to rotation of the cam arm, a laterally extending cam axle attached to the cam, the cam being positioned to engage the lid portion and restrained to limit upward movement of the cam while permitting at least limited forward and rearward movement of the cam; and

a connector member extending between and connected to the sealing member and the cam axle, wherein the cam arm has a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position.

49. The lid assembly of claim **48** wherein the sealing portion is positioned below the drinking aperture and the connector member extends upward from the sealing portion through the drinking aperture.

50. The lid assembly of claim **48** wherein the connector member is pivotally connected to the cam axle.

51. The lid assembly of claim **50** wherein the connector member is rigidly connected to the sealing member.

52. The lid assembly of claim **48** wherein rotation of the cam arm rotates the cam about a first axis and the cam axle has a second axis, with the first and second axes being out of coaxial alignment.

53. The lid assembly of claim **52** wherein when the cam arm is in the first rotational position the second axis of the cam axle is located above and forward of the first axis of the cam, and when the cam arm is in the second rotational position the second axis of the cam axle is located below and rearward of the first axis of the cam.

54. The lid assembly of claim **53** wherein the camming lever is configured such that as the cam arm is moved between the first and second rotational positions the second axis of the cam axle follows a path passing over the first axis of the cam.

55. The lid assembly of claim **52** wherein the sealing member is pivotally attached to the lid main body for rotation about a third axis out of coaxial alignment with both the first and second axes of the cam and the cam axle.

56. The lid assembly of claim **48** wherein the cam arm when in the first rotational position extends over the drinking aperture, thereby shielding the drinking aperture.

57. The lid assembly of claim **48** wherein the cam has a rounded cam peripheral edge wall portion which engages the lid portion, rotation of the cam arm rotates the cam about a first axis at a central location of the cam, and the cam axle has a second axis at a location offset from the central location of the cam.

58. A drinking container assembly, comprising:

a drinking vessel; and

a lid assembly including:

a lid main body having a lid portion with a drinking aperture;

a sealing member having a sealing portion sized and shaped to selectively seal the drinking aperture, the sealing member being pivotally attached to the lid main body and rotatably movable between a sealed position with the sealing portion sealing the drinking aperture and an unsealed position with the sealing portion unsealing the drinking aperture;

a camming lever having a cam arm attached to a cam to rotate the cam in response to rotation of the cam arm, a laterally extending cam axle attached to the cam, the cam being positioned to engage the lid portion and restrained to limit upward movement of

the cam while permitting at least limited forward and rearward movement of the cam, the cam having a rounded cam peripheral edge wall portion which engages the lid portion, rotation of the cam arm rotates the cam about a first axis at a central location of the cam, and the cam axle has a second axis at a location offset from the central location of the cam;

a connector member extending between and connected to the sealing member and the cam axle, wherein the cam arm has a first rotational position whereat the cam axle is in a first position holding the sealing portion of the sealing member in the sealed position and a second rotational position whereat the cam axle is in a second position with the sealing portion of the sealing member in the unsealed position; and

the cam has a rounded cam peripheral edge wall portion which engages the lid portion, rotation of the cam arm rotates the cam about a first axis at a central location of the cam, and the cam axle has a second axis at a location offset from the central location of the cam.

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