(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 June 2010 (10.06.2010)

PCT

(10) International Publication Number
WO 2010/065732 A2

(51) International Patent Classification:
E05B 47/00 (2006.01)

(21) International Application Number:
PCT/US2009/066572

(22) International Filing Date:
3 December 2009 (03.12.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

61/119,667	3 December 2008 (03.12.2008)	US
61/144,306	13 January 2009 (13.01.2009)	US
61/244,320	21 September 2009 (21.09.2009)	US
61/246,388	28 September 2009 (28.09.2009)	US
61/248,269	2 October 2009 (02.10.2009)	US
61/248,223	2 October 2009 (02.10.2009)	US

(71) Applicant *(for all designated States except US)*: **CHECKPOINT SYSTEMS, INC.** [US/US]; 101 Wolf Drive, Thorofare, NJ 08086 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **SHUTE, Matthew, R.** [US/US]; 11725 Morgan Horse Trail, Huntersville, NC 28078 (US). **KOZLOWSKI, William, Jacob** [US/US]; 360 Shoreline Parkway, Tega Cay, SC 29708 (US).

(74) Agents: **GLESSNER, Michele M.** et al.; Alston & Bird LLP, Bank Of America Plaza, 101 South Tryon Street, Suite 4000, Charlotte, NC 28280-4000 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: LOCKING DEVICE FOR TOTE BIN

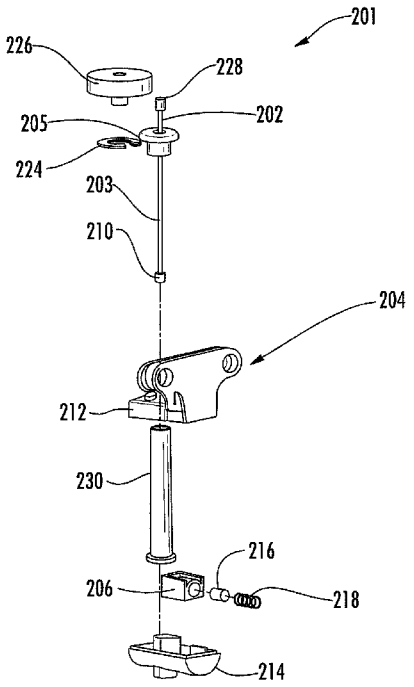

FIG. 16

(57) Abstract: A locking device is provided for locking a container having sidewalls and at least one lid defining an open position and a closed position. The locking device may include an elongate lock member configured to engage the lid(s) and a lock housing that is associated with at least one of the sidewalls. The lock housing may be configured to at least partially receive the elongate lock member. The locking device may be designed to be installed on the container in the field, or the locking device may be integrally formed with the container. The lock housing may include a security element that is detectable by a security system to guard against theft of the container. In some cases, a security module is provided that releasably attaches to the lock housing to provide further alarm functionality.

WO 2010/065732 A2

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

LOCKING DEVICE FOR TOTE BIN

BACKGROUND

Many people find tote bins to be useful for storing, shipping, and handling material. For example, tote bins can be used to hold personal items, retail products, and other articles that may need to be secured. Tote bins are typically made of molded plastic to provide a light-weight container.

In general, tote bins include a cover to keep articles inside the tote bin and to keep dust, dirt, and moisture out. The cover may be a single molded plastic lid that is separate from the tote bin and snaps on to the sides of the container to close. In this case, the lid can be removed by flexing portions of the lid to disengage the lid from the rest of the tote bin. Some tote bins include a cover that is connected to part of the container via a hinge that allows the lid to remain attached to the tote bin even in the open position.

Often times, tote bins are used for holding items that the owner wishes to keep safe. For example, the owner may place valuable merchandise or personal belongings in the tote bin that he wishes to safeguard from shoplifters or thieves. As another example, the owner may place potentially harmful or dangerous items in the tote bin that he wishes to keep away from curious children or pets, such as paint, household cleaners, or other chemicals.

Applicant has discovered that it would be desirable to provide devices and methods of reliably securing articles within tote bins in a way that does not add significantly to the cost or complexity of manufacture of the tote bin. As described in greater detail below, a variety of challenges were identified and overcome through Applicant's efforts to invent and develop such a device.

BRIEF SUMMARY OF THE INVENTION

Devices and systems are therefore provided for providing a reliable and effective way to lock a tote bin or other similar container.

In some embodiments, a locking device for locking a container having sidewalls and at least one lid defining an open position and a closed position is provided. The locking device includes an elongate lock member configured to engage one of the at least

one lid or at least one of the sidewalls and a lock housing associated with the other of the at least one lid or the at least one of the sidewalls. The lock housing is configured to at least partially receive the elongate lock member. The lock housing comprises a lock assembly defining a locked position, wherein, in the locked position, the lock assembly is configured to engage the elongate lock member and secure the at least one lid in the closed position, and further comprises a security element.

In some embodiments, the lock housing further comprises an audible alarm device, an energy source, and a sense loop configured to detect a fault condition associated with the locking device. The locking device may include a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device and an energy source.

In some cases, the elongate lock member defines a locking surface, and the lock assembly comprises a locking spring defining engaging ends that are biased to engage the locking surface of the elongate lock member. In other cases, the elongate lock member may define a locking surface, and the lock assembly may comprise a locking slider that is spring biased to engage the locking surface of the elongate lock member.

The elongate lock member may comprise a flexible cable defining a locking surface, and the lock assembly may be configured to engage the locking surface of the flexible cable when the lock assembly is in the locked position. Furthermore, the flexible cable may be movable from an extracted position to a retracted position, and the lock assembly may be configured to engage the locking surface of the flexible cable when the flexible cable is in the retracted position. A retraction force may be required to drive the flexible cable from the extracted position to the retracted position, and the flexible cable may define a driving element configured to be grasped by a user when applying the retraction force. At least one lid may comprise a cable retaining element configured to frictionally resist movement of the flexible cable from the extracted position to the retracted position, and the flexible cable may define a drive rigidity for reducing buckling of the flexible cable when the retraction force is applied.

In some cases, the container comprises a first lid and a second lid, and the elongate lock member is configured to engage and secure the first lid and the second lid in the closed position when the lock assembly is in the locked position. The elongate lock member may comprise a rigid member defining a locking surface, and the locking surface may comprise a protrusion, where the lock housing comprises a locking slider configured to engage the protrusion when the lock assembly is in the locked position. Further, the container may comprise a first lid and a second lid, and the elongate lock member may be configured to engage and secure the first lid and the second lid in the closed position when the lock assembly is in the locked position. The elongate lock member may be

configured to remain with the first lid when the elongate lock member is in an extracted position and the first lid is in the open position.

In other embodiments, a locking device is provided for locking a container having sidewalls and at least one lid defining an open position and a closed position. The locking device comprises a latch pin configured to engage the at least one lid and defining a locking surface and a lock housing associated with at least one of the sidewalls, wherein the lock housing is configured to at least partially receive the latch pin. The lock housing comprises a locking slider defining a locked position and having an engagement surface, wherein the engagement surface is configured to engage the locking surface of the latch pin and secure the at least one lid in the closed position when the locking slider is in the locked position, and a security element.

The locking surface may comprise notches configured to engage the engagement surface of the locking slider. The locking slider may comprise a magnetic element that is moveable between the locked position and an unlocked position, and the magnetic element may be spring biased in the locked position. The magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element. In some cases, the locking device further includes a frictional element configured to fit around the latch pin and to provide an interference fit between the latch pin and a hole defined by one of the at least one lid through which the latch pin passes. The frictional element may be configured to frictionally resist movement of the latch pin from an extracted position to a retracted position.

In still other embodiments, a locking device is provided for locking a container having sidewalls and at least one lid defining an open position and a closed position. The locking device comprises a flexible cable configured to engage the at least one lid and defining a locking surface and a lock housing associated with at least one of the sidewalls, wherein the lock housing is configured to at least partially receive the flexible cable. The lock housing comprises a locking slider defining a locked position and having an engagement surface, wherein the engagement surface is configured to engage the locking surface of the latch pin and secure the at least one lid in the closed position when the locking slider is in the locked position, and a security element.

The locking surface may comprise at least one ferrule configured to engage the engagement surface of the locking slider, and the locking slider may comprise a magnetic element that is moveable between the locked position and an unlocked position, wherein the magnetic element is spring biased in the locked position. The magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element.

The flexible cable may be movable from an extracted position to a retracted position, and the lock assembly may be configured to engage the locking surface of the flexible cable when the flexible cable is in the retracted position. A retraction force may be required to drive the flexible cable from the extracted position to the retracted position, and the flexible cable may define a driving element configured to be grasped by a user when applying the retraction force. Further, the flexible cable may define a drive rigidity for reducing buckling of the flexible cable when the retraction force is applied.

In some cases, the locking device further comprises a guide element fixedly disposed within the at least one sidewall associated with the locking housing and at least partially surrounding the flexible cable when the flexible cable is in the retracted position. The guide element may be configured to direct the flexible cable towards the lock housing as the flexible cable is driven from the extracted position to the retracted position, and the guide element may be configured to shield at least part of the flexible cable when the flexible cable is in the retracted position.

In some embodiments, the at least one lid comprises a cable retaining element configured to frictionally resist movement of the flexible cable from an extracted position to a retracted position. The container may comprise a first lid and a second lid, and the flexible cable may be configured to engage and secure the first lid and the second lid in the closed position when the locking slider is in the locked position.

In still other embodiments, a locking device is provided for locking a container having sidewalls, a first lid, and a second lid, the first and second lids defining an open position and a closed position. The locking device comprises a locking extension extending from the first lid, the locking extension defining a locking surface, and a receiving cavity formed in the second lid, wherein the receiving cavity is configured to receive the locking extension as the first and second lids are moved from the open position to the closed position. The receiving cavity may comprise a locking spring defining engaging ends that are configured to engage the locking surface as the locking extension is received into the receiving cavity. In some cases, the locking surface comprises notches defined in the locking extension. Further, the locking extension may be configured to flex to accommodate an arcuate joining of the locking extension with the receiving cavity as the respective lids are moved from the open position to the closed position.

In still other embodiments, a locking device is provided for locking a container having sidewalls, a first lid, and a second lid, the first and second lids defining an open position and a closed position. The locking device comprises a locking plunger extending from the first lid, the locking plunger defining a locking surface, and a lock housing associated with the second lid. The lock housing comprises a locking shuttle defining an

engagement surface configured to engage the locking surface, wherein the locking shuttle is configured to move between a locked position and an unlocked position. In the locked position the engagement surface is configured to engage the locking surface.

The locking shuttle may comprise a magnetic element that is moveable between the locked position and an unlocked position, wherein the magnetic element is spring biased in the locked position. The magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element and moving the magnetic key in the direction of the unlocked position.

The locking plunger may comprise a shaft portion extending from the first lid and an enlarged portion disposed at an end of the shaft portion, wherein the enlarged portion comprises the locking surface. The engagement surface may comprise a locking aperture defined by the locking shuttle and may be configured to partially surround the shaft portion and engage the locking surface, thereby preventing passage of the enlarged portion through the locking aperture in the locked position. In some cases, the locking shuttle may comprise a tapered surface configured such that, when the locking shuttle is in the locked position and the first lid is moved to the closed position, the enlarged portion rides along the tapered surface and displaces the locking shuttle to allow the locking aperture to partially surround the shaft portion and engage the locking surface.

In still other embodiments, a locking device is provided for locking a container having sidewalls and at least one lid. The locking device comprises a connecting bar extending along the at least one lid between a first lock point of the container and a second lock point of the container and movable between an extracted position and a retracted position. The connecting bar comprises a first locking portion proximate the first lock point, a second locking portion proximate the second lock point, and a main portion extending between the first locking portion and the second locking portion, wherein the main portion defines a locking surface proximate the first lock point. The locking device also comprises a lock housing formed in the at least one lid proximate the first lock point, wherein the lock housing comprises a locking slider defining a locked position and including an engagement surface configured to engage the locking surface of the main portion when the locking slider in the locked position. Further, the container sidewalls define a first receiving cavity proximate the first lock point that is configured to receive the first locking portion and a second receiving cavity proximate the second lock point that is configured to receive the second locking portion substantially simultaneously with receipt of the first locking portion by the first receiving cavity when the connecting bar is in the retracted position.

In some cases, the locking surface comprises a notch defined by the main portion of the elongate lock member. The connecting bar may be configured to slide within a channel formed in the at least one lid between the retracted position and the extracted position. The connecting bar may also define a grasping portion between the main portion and the first locking portion configured to be grasped by a user such that a user can move the connecting bar between the retracted position and an extracted position. In some cases, only the grasping portion is accessible to the user when the connecting bar is in the retracted position.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 illustrates a tote bin in accordance with one exemplary embodiment of the present invention;

FIG. 2 illustrates a locking device in accordance with one exemplary embodiment of the present invention;

FIG. 3 is a cross-sectional view of the locking device of Fig. 2;

FIG. 4 is a detail view of a locking surface of a locking pin and an engagement surface of a locking spring shown in Fig. 3;

FIG. 5A illustrates a front view of a locking spring in accordance with one exemplary embodiment of the present invention;

FIG. 5B illustrates a side view of the locking spring of Fig. 5A;

FIG. 6A illustrates a perspective view of an end of the locking pin of Fig. 2 in accordance with one exemplary embodiment of the present invention;

FIG. 6B illustrates a side view of the end of the locking pin of Fig. 6A;

FIG. 6C illustrates a front view of the end of the locking pin of Fig. 6A;

FIG. 7 illustrates a locking device structured in accordance with another exemplary embodiment of the present invention;

FIG. 8 illustrates an exploded view of the locking device of Fig. 7;

FIG. 9 is a cross-sectional view of the locking device of Fig. 7;

FIG. 10A is a cross-sectional detail view of the locking device of Fig. 7 with the locking slider assembly in a locked position;

FIG. 10B is a cross-sectional detail view of the locking device of Fig. 7 with the locking slider in an unlocked position;

FIG. 11 illustrates a magnetic key in accordance with one exemplary embodiment of the present invention;

FIG. 12 illustrates an exploded view of the locking device in accordance with another exemplary embodiment;

FIG. 13 illustrates a perspective view of the locking device of Fig. 12;

FIG. 14 is a cross-sectional view of the locking device of Fig. 12 with the flexible cable in a retracted position and the locking slider in a locked position;

FIG. 15 is a cross-sectional detail view of the locking device of Fig. 14;

FIG. 16 illustrates an exploded view of the locking device in accordance with another exemplary embodiment;

FIG. 17 illustrates a perspective view of the locking device of Fig. 16;

FIG. 17A is a cross-sectional view of the locking device of Fig. 17;

FIG. 18 is a cross-sectional view of the locking device of Fig. 16 with the flexible cable in the extracted position;

FIG. 19 is a cross-sectional view of the locking device of Fig. 16 with the flexible cable in the retracted position;

FIG. 20 is a cross-sectional detail view of the locking device of Fig. 19;

FIG. 21 is a cross-sectional view of the tote bin with the flexible cable in the extracted position in accordance with an exemplary embodiment;

FIG. 22 illustrates a side view of the tote bin in accordance with an exemplary embodiment showing finger pockets;

FIG. 23 illustrates a side view of a tote bin with an integral locking device in accordance with another exemplary embodiment;

FIG. 24 illustrates a side view of a tote bin with an integral locking device in accordance with another exemplary embodiment;

FIG. 25 is a cross-sectional detail view of the locking device of Figs. 23 and 24;

FIG. 26 illustrates a top view of a tote bin with an integral locking device in accordance with another exemplary embodiment;

FIG. 27 is a cross-sectional detail view of the locking device of Fig. 26;

FIG. 28 illustrates a top view of a tote bin with an integral locking device in accordance with another exemplary embodiment;

FIG. 29 is a side detail view of the locking device of Fig. 28 with the locking shuttle in the locked position;

FIG. 29A is a top detail view of the locking shuttle of Fig. 29;

FIG. 30 is a side detail view of the locking device of Fig. 28 with the locking shuttle in the unlocked position;

FIG. 31 illustrates a top view of a tote bin with an integral locking device in accordance with another exemplary embodiment;

FIG. 32A is a cross-sectional detail view of the locking device of Fig. 31 at a first lock point with the connecting bar retracted;

FIG. 32B is a cross-sectional detail view of the locking device of Fig. 32A with the connecting bar extracted;

FIG. 33A is a cross-sectional detail view of the locking device of Fig. 31 at a second lock point with the connecting bar retracted;

FIG. 33B is a cross-sectional detail view of the locking device of Fig. 33A with the connecting bar extracted;

FIG. 34 illustrates a cross-sectional view of a lock housing in accordance with an exemplary embodiment including a security element and alarm components;

FIG. 35 is a block diagram of the lock housing of Fig. 34;

FIG. 36 is a block diagram of a security module device in accordance with an exemplary embodiment;

FIG. 37 illustrates a partial side view of the locking device in accordance with an exemplary embodiment including an attached security module;

FIG. 38 illustrates a partial side view of the locking device of Fig. 37 with the security module detached; and

FIG. 39 illustrates a cross-sectional view of a lock housing in accordance with an exemplary embodiment in which the lock housing is to be used in conjunction with a security module.

DETAILED DESCRIPTION

Embodiments of the present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like reference numerals refer to like elements throughout.

Embodiments of the locking device described below provide a reliable and effective way to lock a tote bin or other similar container. In some embodiments, the locking device is integrally manufactured with the tote bin. For example, the locking device may be molded into the sidewalls and/or one or more of the lids of the tote bin at the same time that the tote bin is formed. In other embodiments, the locking device may be permanently or releasably attached to the tote bin. The description that follows outlines several exemplary embodiments. A first embodiment is shown in Figs. 2–6; a second embodiment is shown in Figs. 7–11; a third embodiment is shown in Figs. 12–15;

a fourth embodiment is shown in Figs. 16–22; a fifth embodiment is shown in Figs. 23–25; a sixth embodiment is shown in Figs. 26–27; a seventh embodiment is shown in Figs. 28–30; and an eighth embodiment is shown in Figs. 31–33B. In some cases, the locking device may also include anti-theft features, as described below and shown in Fig. 34–39. The inventive concepts described herein are not limited to the specific examples depicted in the figures and may be applied to any tote bin or container locking device, as will be apparent to those of ordinary skill in the art in view of this disclosure.

As described below, some embodiments of the locking device, including those described in connection with Figs. 1–25, for example, may include an elongate lock member that is associated with at least one lid of the tote bin and a lock housing that is associated with at least one sidewall of the tote bin and remains with the tote bin even when the lock is disengaged and the lid is opened. In other embodiments, the locking device may be associated only with the lids of the tote bin. The elongate lock member, in some cases, may be a rigid member that includes a locking surface that is stepped or notched. In other cases, the elongate lock member may include a flexible cable with a locking surface formed at an end of the cable. The lock housing may include a lock assembly that is configured to engage the locking surface of the elongate lock member to secure the lid in a closed and locked position. The lock assembly may be unlocked to allow the elongate lock member to be disengaged from the lock housing via a key (e.g., a magnetic key), thereby allowing the lid to be opened. The locking device may further include or be usable with a security element and/or a security module configured to provide alarm functionality, for example, when the tote bin is removed from a specified location and/or when the lock has been compromised.

In some embodiments, described below, a locking device is provided for locking a container having sidewalls and at least one lid defining an open position and a closed position. The locking device may include an elongate lock member configured to engage one of the at least one lid or at least one of the sidewalls and a lock housing associated with the other of the at least one lid or the at least one of the sidewalls. The lock housing may be configured to at least partially receive the elongate lock member. Thus, the lock housing may include a lock assembly defining a locked position, in which the lock assembly is configured to engage the elongate lock member and secure the lid(s) in the closed position. In other words, the lids may be movable between the open position and the closed position; the elongate lock member may be movable between an extracted position (e.g., withdrawn from the lock housing) and a retracted position (e.g., received into the lock housing); and the lock assembly may be movable between the locked position (e.g., engaging or positioned to engage the elongate lock member) and the unlocked position (e.g., positioned away from the elongate lock member).

Fig. 1 depicts an example of a tote bin **10**. The tote bin **10** may be sized and shaped in various ways. For example, the tote bin **10** of Fig. 1 includes a body portion **12** and opposed foldable lids **14**, **16**. The tote bin **10** may be opened by pulling the lid portions away from the body **12** of the tote bin **10**. Handles **18** may be formed in the body portion **12** to help a user carry the tote bin **10**. The handles **18** may be defined by an integrally-molded concavity or protrusion formed on the body portion **12** sidewalls, as shown, or the handles **18** may be formed separately and attached to the body portion or elsewhere on the tote bin, e.g., via an adhesive or fasteners.

Fig. 2 shows a locking device **20** according to one embodiment. The locking device includes a housing **22**, a locking pin **24**, and a retaining grommet **26**. The housing **22**, which is shown in cross-section in Fig. 3, defines a first opening **28**, a second opening **30**, and a third opening **32** through which portions of the locking pin **24** pass. In this regard, the housing **22** defines an interior portion **34** that resides within a sidewall **36** of the tote bin **10**, as shown in Fig. 3, and an exterior portion **38** that is external to the sidewall **36**.

The locking pin **24** shown in Fig. 2 represents an exemplary elongate lock member. Other exemplary elongate lock members (e.g., latch pin **102**, flexible cable **202**, etc.) are shown in connection with the other locking device embodiments discussed below. Accordingly, the present invention is not limited to a specific elongate lock member structure and may be applied to any elongate structure that is associated with a container lid, configured to be received by a lock housing, and further configured to be engaged by a lock assembly.

The interior portion **34** defines a first channel **40** in which a first leg **42** of the U-shaped locking pin **24** is configured to reside via the first opening **28**. The second leg **44** of the U-shaped locking pin **24** may be configured to pass through a second channel **46** defined by the exterior portion **38** of the housing **22** via the second opening **30** and the third opening **32**. Referring to Fig. 3, the retaining grommet **26** may be formed of an elastomer or other durable material and may be configured to fit on the first leg **42** of the locking pin **24** and within a hole **48** formed in the lid **16** of the tote bin, thereby holding the locking pin **24** to the lid **16** when the lock **20** is unlocked and the lid **16** is opened. In cases where the tote bin has two lid portions, as pictured in Fig. 1, the lids **14**, **16** may be configured to overlap, such that the first lid **16** covers and secures at least a portion of the second lid **14**, as shown in Fig. 3. In this case, the retaining grommet **26** may be configured to hold the locking pin **24** to the first lid **16** when the tote bin is unlocked and the lids are opened.

Turning now to Fig. 4, a detail view of the lock assembly or mechanism of the locking device **20** shown in Fig. 3 is provided. The second leg **44** of the locking pin **24**

includes a locking surface **50** comprising a series of notches **54** that are configured to engage a locking spring **52** such that the engaging ends **56** of the locking spring **52** are received, in a locked position, into notches **54** and, thus, prevent the second leg **44** from being retracted from the second opening **30** of the housing. Thus, when the locking spring **52** is engaged with the locking surface **50** of the locking pin **24**, the lock **20** is in the locked position and the lids **14**, **16** are secured to the sidewall **36** of the tote bin. It is noted that the sidewall **36** may define a rim or ledge, to which the lids **14**, **16** are secured when the locking device is in the locked position. The term "sidewall" is used in this disclosure for purposes of explanation and is understood to include the sidewall, any rim, ridge, flange, overhanging portion, or other feature that is defined by or affixed to the sidewall and may be used to anchor the lid(s) in a locked position.

The locking spring **52**, which is shown separately in Figs. 5A and 5B, may be made of a material that reacts to an applied magnetic force. In this way, the locking device **20** may be released by applying a magnetic key **58** to the exterior portion **38** of the housing **22**, as shown in Fig. 3. The magnetic force (indicated by the series of arrows in Figs. 3 and 4) serves to overcome the bias of the spring's engaging ends **56** towards the locking surface **50** and, thus, may remove the engaging ends **56** from engagement with the locking surface **50**. The locking device is thus "unlocked," and the locking pin **24** may be retracted via the second opening **30** of the housing.

In one embodiment, a portion of the second leg **44** of the locking pin **24** may be smooth (e.g., devoid of notches) such that once the locking surface **50** is clear of the locking spring **52**, the magnetic key **58** may be removed from the exterior portion **38** of the housing and the remaining smooth surface of the locking pin **24** may be able to slide past the locking spring **52**. In some embodiments, the smooth portion of the second leg **44** of the locking pin **24** may form a bulge **60** at its end, as pictured from three angles in Figs. 6A, 6B, and 6C. The second channel **46** formed in the exterior portion **38** of the housing may be configured such that the maximum width of the bulge **60** (illustrated in Fig. 6C) is only able to pass through the channel in a certain orientation. In this way, rotation of the locking pin **24** within the housing **22** may be reduced. Furthermore, the second opening **30** may be configured to have a smaller diameter than the width of the bulge **60**, thereby preventing the separation of the second leg **44** of the locking pin **24** from the assembly.

In other embodiments, a locking device **100** is provided as shown in Figs. 7 and 8. With reference to Fig. 8, the lock **100** includes a latch pin **102**, a housing **104**, and a locking slider **106**. The latch pin **102** is configured to pass through holes **108** defined in the lids **14**, **16** and sidewall **36** of the tote bin **10** (shown in Fig. 9) such that a locking surface **110** of the latch pin **102** may engage the locking slider **106** when the tote bin is

locked. The housing **104** may comprise a top portion **112** and a bottom portion **114** that are configured to fit together and surround the locking slider **106**. In this regard, the top and bottom portions form a space in which the locking slider **106** is configured to move into and out of engagement with the locking surface **110** of the latch pin **102**, as shown in Figs. 9, 10A, and 10B. The housing **104** may be attached to the sidewall **36** via fasteners, such as rivets, that pass through holes **113** formed in the housing **104** and sidewall **36**. In other embodiments, at least one of the sidewalls at least partially forms the lock housing **104** (e.g., the housing may be integrally formed with a sidewall of the tote bin), as will be apparent to one of ordinary skill in the art in view of this disclosure.

The locking slider **106** may include a magnetic element (e.g., a steel pin **116**) that is movable between a locked position and an unlocked position and a compression spring **118** that is configured to surround the steel pin **116** and bias the locking slider **106** towards the locked position, in which the engagement surface of the locking slider **106** may engage the locking surface **110** of the latch pin **102**, as shown in Fig. 9. Thus, when the lock **100** is in a locked configuration, as depicted in Fig. 10A, an engagement surface **120** of the locking slider **106** is pushed into engagement with the locking surface **110** of the latch pin **102**. For example, the locking surface **110** may include notches that are configured to engage corresponding notches on the engagement surface **120** of the locking slider **106**.

Referring again to Fig. 8, the steel pin **116** may be configured to fit within the locking slider **106** in such a way that the locking slider **106** moves with the steel pin **116**. For example, the locking slider **106** may form an interference fit with the steel pin **116**, or the steel pin **116** may be otherwise fixed to the locking slider **106**. Although a steel pin **116** is described above, it is understood that the magnetic element may be made of other magnetic materials. Thus, the magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element. For example, as shown in Fig. 11, the application of a magnetic key **122** to the exterior portion of the housing **104** may serve to attract the steel pin **116** away from the latch pin **102** and may thus move the locking slider **106** out of engagement with the locking surface **110** of the latch pin **102** (i.e., by compressing the spring **118**) as illustrated in Fig. 10B. Therefore, when the magnetic key **122** is applied, the latch pin **102** may be removed from the hole **108** defined in the lids **14**, **16** and sidewall **36** of the tote bin.

In some embodiments, a frictional element, such as a C-clip **124**, is provided (shown in Figs. 8 and 9) for maintaining the latch pin **102** with the first lid **16**. For example, the C-clip **124** may be configured to fit onto the latch pin **102** and to provide an interference fit with the hole **108** formed in the first lid **16**. In this way, the latch pin **102**

may only be disengaged from the locking slider **106** and retracted from the housing **104** by opening the respective lid, as the latch pin is not movable separately from the lid.

An alternative embodiment to that illustrated in Figure 8 is illustrated in Figures 12–15. The locking device **200** of the illustrated embodiment features a flexible cable **202**, a housing **204**, and a locking slider **206**. The flexible cable **202** may be made of a multi-strand steel cable with or without a vinyl coating **203**; however, other materials of sufficient strength and flexibility may also be used. The flexible cable also includes a locking surface **210** that may comprise ferrules or similar features that can be grasped by the lock assembly described below.

The flexible cable **202** is configured to pass through holes **208** defined in the lids **14, 16** and sidewall **36** of the tote bin **10** (shown in Fig. 14) such that the locking surface **210** of the flexible cable **202** is positioned for engagement by the locking slider **206** when the locking slider is in the locked position and the respective lids are closed. The flexible cable **202** may include a cable retaining element **205** that is configured to seat itself on the surface of the first lid **16** and maintain the flexible cable with the respective lid. Thus, as with the embodiment described above in connection with the latch pin of Figs. 7–11, the flexible cable **202** is extracted from the lock assembly by opening the lid **16**, as the flexible cable in this embodiment is not movable separately from the lid. As a result, a retraction force **R** (shown in Fig. 18) is required to drive the flexible cable from the extracted position to the retracted position, and the flexible cable itself thus defines a drive rigidity for reducing the tendency of the flexible cable to buckle when the retraction force **R** is being applied (e.g., via movement of the lid).

Referring to Fig. 12, the housing **204** may comprise a top portion **212** and a bottom portion **214** that are configured to fit together and surround the locking slider **206**. In this regard, the top and bottom portions **212**, **214** form a space in which the locking slider **206** is configured to move into and out of engagement with the locking surface **210** of the flexible cable, as shown in Figures 14 and 15. The housing **204** may be attached to the sidewall **36** via fasteners, such as rivets, that pass through holes **213** formed in the housing **204** and sidewall **36**. In other embodiments, the housing may be integrally formed with the sidewall of the tote bin, as will be apparent to one of ordinary skill in the art in view of this disclosure.

The locking slider **206** may include a magnetic element (such as the steel pin **216** described above) and a compression spring **218** that is configured to surround the steel pin **216** and bias the locking slider **206** towards engagement with the locking surface **210** of the flexible cable **202**, as shown in Figs. 14 and 15. Thus, when the locking device **200** is in a locked position, as depicted in Fig. 13, an engagement surface **220** of the locking slider **206** is pushed into engagement with the locking surface **210** of the flexible cable

202. In one example, the locking surface **210** may include notches or ferrules **211** that are configured to engage corresponding features in the engagement surface **220** of the locking slider **206**.

Referring again to Figs. 14 and 15, the steel pin **216** may be configured to fit within the locking slider **206** in such a way that the locking slider **206** moves with the steel pin **216**. For example, the locking slider **206** may form an interference fit with the steel pin **216**, or the steel pin **216** may be otherwise fixed to the locking slider **206**. Although a steel pin **216** is described above, it is understood that the pin **216** may be made of other magnetic materials.

In various embodiments, for example in the embodiment shown in Fig. 11, application of a magnetic key **122** to the exterior portion of the housing **204** may serve to attract the steel pin **216** away from the flexible cable **202** and may thus move the locking slider **206** out of engagement with the locking surface **210** of the flexible cable **202** (i.e., by compressing the spring **218**). Said differently, the magnetic element (e.g., the steel pin **216**) may be driven from the locked position to the unlocked position against the spring bias of the compression spring when the magnetic key is positioned in magnetic proximity to the magnetic element. The flexible cable **202** may then be removed from the hole **208** defined in the lids **14**, **16** and sidewall **36** of the tote bin.

In some embodiments as shown in Fig. 14, a guide element, such as a guide tube **230**, is fixedly disposed within the at least one sidewall associated with the locking housing. The guide tube **230** at least partially surrounds the flexible cable **202** when the flexible cable is in the retracted position. The guide tube **230** is configured to direct the flexible cable **202** towards the lock housing as the flexible cable is driven from the extracted position to the retracted position and is also configured to protect the flexible cable **202** from a cutting device, for example, to maintain the integrity of the lock in the face of an attempted theft. The end **232** of the guide tube **230** may be captured between the top portion **212** and the bottom portion **214** of the housing **204** to properly locate the guide tube **230** within the side wall **36** of the tote bin and prevent movement of the guide tube **230** as the cable **202** is moved into and out of engagement with the engagement surface **220**.

In some embodiments as shown in Figs. 12 and 14, a frictional element, such as a C-clip **224**, is provided for maintaining the flexible cable **202** with the first lid **16**. For example, the C-clip **224** may be configured to fit onto the cable retaining element **205** and to provide an interference fit with the hole **208** formed in the first lid **16**. In this way, the cable retaining element **205** and one end of the flexible cable **202** may remain fixedly attached to the lid **16**, while the other end of the flexible cable **202** including the locking

surface **210** may be disengaged from the locking slider **206** and extracted from the housing **204** via opening of the respective lid.

In other embodiments, however, a locking device **201** may further include a driving element **226** configured to attach to the top end of the flexible cable **202** (e.g., the end that resides outside the housing **204**), as illustrated in Figs. 16–22. For example, the top end of the cable may include a region of increased diameter, such as a ferrule **228** attached to the top end of the cable **202**, which is press fit into the driving element **226**, as shown in Fig. 18. In this way, a user may grip the driving element **226** to extract the cable **202** from the lock housing **204** and unlock the tote. Thus, in such embodiments, the flexible cable **202** is movable with respect to the lid **16**, in addition to being movable with respect to the lock housing **204**.

In embodiments including the driving element **226**, the cable retaining element **205** may be configured such that the diameter of the opening through which the cable **202** passes is sized to frictionally resist the unintended retraction of the flexible cable **202** back into the housing **204**. In this way, the cable **202** may be biased in the extracted position and may require a retraction force **R** (shown in Fig. 18) to retract the cable into the housing **204**. In addition or alternatively, the cable retaining element **205** may include a spring or other component to bias the cable **202** towards the extracted position when the cable is disengaged from the engagement surface **220**. In this way, the locking surface **210** may be pulled clear of the engagement surface **220** by the force of the spring or other biasing component upon the unlocking of the device.

Thus, a user may extract the cable **202** from the lock housing **204** upon unlocking the locking device (e.g., with the magnetic key **122** of Fig. 11) by applying the retraction force **R** (i.e., pulling on the driving element **226**) and may subsequently cease applying the retraction force without being concerned that the cable **202** will inadvertently retract into the housing **204** and re-engage the locking slider **206**, thereby locking the tote as described above. For example, in the case of a tote bin having two locks on opposite sides of the tote bin, the user may be able to unlock one side and then may proceed to open the other side or otherwise release his grip of the driving element **226** with the aid of the cable bias.

Alternatively or in addition to the friction fit of the cable **202** with the cable retaining element **205**, the first lid **16** itself may be configured with a capture track, clip **240** (shown in Fig. 21), and/or other cable securing feature that the user may engage to hold the cable **202** in the extracted position. For example, the clip **240** may be configured to receive at least a portion of the length of the cable **202** such that the cable **202** is held against the surface of the lid **16** in an extracted position to allow the user to unlock the other side of the tote bin without manually retaining the cable **202** in the extracted

position. The clip **240** may be configured to receive the diameter of the cable **202** once the cable has been extracted from the lock housing **204**, or the clip may be configured to engage the driving element **226** to keep the cable from retracting into the housing **204**. In other embodiments, a capture track may be provided that engages one or more of the driving element **226**, the cable **202**, and/or the cable retaining element **205** in a way that allows the unlocked assembly (driving element, cable, and/or cable retaining element) to "ride" up and down the lid to and from the retracted position. Numerous other features may be used to hold the cable **202** in the extracted position, such as a channel formed in the lid **16** for frictionally receiving the length of the extracted cable, a clasp that can be moved into engagement with the driving element **226**, etc.

In some embodiments, the cable **202** may be configured to define a drive rigidity for reducing buckling of the flexible cable when a retraction force is applied. As will be apparent to one of skill in the art in view of this disclosure, the cable **202** may be flexible enough to bend when such bending is desired (e.g., bending the cable out of the way to facilitate stacking of multiple totes, bending to engage a cable securing feature, etc.) while also possessing sufficient stiffness to allow a user when grasping the driving element **226** to drive the cable **202** back into a retracted position without substantial buckling. Selected values for flexibility and stiffness may vary depending on the application; however, in one embodiment, a 1.59 mm diameter 1x19 preformed galvanized steel cable sheathed with a clear vinyl coating to a 2.381 mm diameter was found to provide desired stiffness and flexibility. Sheathing **203** provided in such embodiments may impart a degree of added stiffness and reduce wear on the cable that may otherwise occur as a result of repeated withdrawals of the cable **202** from the guide tube **230** and cable retaining element **205**. Furthermore, the sheathing **203** may be configured to provide a desired degree of friction to the surface of the cable **202**, such that the cable has a tendency to remain in the extracted position once the tote bin is unlocked, as previously described.

Referring again to Fig. 18, starting from the unlocked position, a user may thus be able to push the driving element **226** towards the cable retaining element **205** (for example, after releasing the cable **202** or driving element **226** from the securing feature) without substantial buckling of the cable **202**. The cable **202** is simply pushed back through the guide tube **230** until the locking surface **210** is positioned for engagement by the locking slider **206** as shown in Fig. 19. Alternatively, in cases where the elongated lock member is rigid, a movable joint, such as a hinge or ball joint, may be provided to allow the elongate lock member (e.g., the locking pin **24** or latch pin **102**) to be moved from a position generally perpendicular to the surface of the first lid **16** to a position

generally parallel to the lid **16** when unlocked for securing the elongated member and opening the tote.

In some embodiments, the locking surface **210** may differ from that shown, for example, in Fig. 14. For example, as shown in Figs. 18–20, the locking surface **210** may define a region of increased diameter, such as a second ferrule **229** proximate the bottom end of the cable **202**. Thus, as the driving element **226** is pushed towards engagement with the cable retaining element **205**, the second ferrule **229** may engage the angled surface of the locking slider **206** and cause the slider to move away from the cable **202**, against the force of the spring **218**. Once the second ferrule **229** has cleared the locking slider **206** (as shown in Figs. 19 and 20), however, a top ledge of the ferrule **229** may be securely captured by the engagement surface **220** of the locking slider **206**, thereby locking the tote bin. The tote bin may be unlocked using a magnetic key (such as the key **122** of Fig. 11) to draw the locking slider **106** out of engagement with the engagement surface **220**, as described above.

Locking devices structured in accordance with various embodiments may be integrally molded into tote bins at manufacture or may be offered as retrofit, detachable locking devices that are fastened to a conventional tote bin at some point after its manufacture. In each embodiment, it is important that the locking device be structured and positioned to limit any detrimental effects that the structure of the locking device may have on the primary function of the tote bins, i.e., to provide an enclosure and a transport for stored items. For example, in one embodiment, it may be desirable to position the structure of the locking device outside of the tote bin (to avoid decreasing tote bin carrying volume) perhaps proximate the tote bin handles. In such embodiments, the locking device may be integrally formed with or attached to the handles of the tote bin such that finger pockets remain defined by the handle (i.e., within a handle cavity) as illustrated, for example, by the retrofit locking device of Fig. 22.

The depicted locking device **201** may be attached to an edge of the tote bin **10** such that a finger pocket **250** is provided on either side of the locking device. The finger pockets **250** may be configured to receive a user's fingers to facilitate the lifting and carrying (i.e., transport) of the tote bin. In this regard, a cavity may extend the length of one or more edges of the tote bin and may, for example, be formed during the molding of the sidewall **36** of the tote bin. Installation of a locking device **201** along the edge of such a tote bin may thus convert the single cavity into two finger pockets **250**, allowing the user to grasp the tote bin via one or both of the pockets **250**.

Turning to Fig. 23, in some cases, the locking device may be an integral locking device **400** that is integral to the tote bin **10**, such as, for example, comprising a housing **404** that is at least partially molded into the sidewall **36** of the tote bin. In this case, the

handle **18** may define a window opening **401** configured to allow a user to apply a magnetic key **122** (shown in Fig. 11) to the exterior portion of the housing **404** to unlock the device. Otherwise, without such access, the user may not be able to position the key **122** in magnetic proximity to the locking device **400**. Furthermore, the integral locking device **400** may be positioned off-center with respect to the top edge of the sidewall **36** (shown in Fig. 24), rather than centered as shown in Fig. 23, for example, so as to allow a larger volume cavity for a user to grip the tote.

In addition to the location of the integral locking device **400**, the device itself may have a different configuration than that of the above-described embodiments. For example, with reference to Fig. 25, the integral locking device **400** may include a driving element **405**, a rigid member **402**, and a sheath **403** surrounding and fixedly engaging the rigid member. Protrusions **428**, **410** may be defined at each end of the sheath **403**. The proximal protrusion **428** may connect the rigid member **402** and sheath **403** to the driving element **405**, whereas the distal protrusion **410** may act as a locking surface for engaging the engagement surface of the locking slider **206**, as shown and described above with respect to Figs 18–20, for example. Thus, in such an embodiment, the elongate lock member need not be a relatively long, flexible cable, but may instead be a relatively short, rigid rod for engaging and disengaging the locking slider **206**.

In still other embodiments, an integral locking device **500** may be defined as part of the first and second lids **16**, **14**, as illustrated in Figs. 26 and 27. In this case, the first lid **16** may define a locking extension **510**, and the second lid **14** may define a receiving cavity **520**. The locking extension **510** may include a series of notches **554** that are configured to engage a locking spring **552** such that the engaging ends **556** of the locking spring are received, in a locked configuration, into the notches **554** and, thus, prevent the locking extension from being retracted from the receiving cavity **520**. In other words, when the locking spring **552** is engaged with the notches **554** of the locking extension **510**, the integral locking device **500** is locked and the lids **14**, **16** are secured to each other in the closed position.

The engaging ends **556** of the locking spring **552** may comprise magnetic elements (e.g., may be made of or include magnetic materials) that are moveable between a locked position and an unlocked position, and the magnetic elements may be spring biased in the locked position via the locking spring. To unlock the integral locking device **500** of the embodiments of Figs. 26 and 27, a magnetic key **122** such as the one previously described may be applied to an exterior portion of the second lid **14** to position the magnetic key in magnetic proximity to the magnetic elements and thus attract the engaging ends **556** away from the notches **554** to allow the locking extension **510** to be removed from the receiving cavity **520**.

The locking extension **510** may be configured to have some flexibility, such that, as the lids **14**, **16** are opened, the locking extension is able to bend as necessary while being removed from the receiving cavity **520** (i.e., due to the arc-like motion of the lids with respect to the body portion of the tote bin). In other words, the locking extension **510** may be configured to flex to accommodate the arcuate joining of the locking extension with the receiving cavity **520** as the respective lids are moved from the open position to the closed position. At the same time, however, the locking extension **510** may be configured to be fully received into the receiving cavity **520** once the end of the locking extension has passed through the opening **521** of the receiving cavity with relative ease (e.g., without the application of an excessive retraction force by the user to push the locking extension into engagement with the receiving cavity). The locking device **500** may be integrally formed on one or both sides of the respective lids **14**, **16**, as shown in Fig. 26, or a single locking device may be defined in a central portion of the lids (not shown).

In other embodiments, an integral locking device **600** may be provided as shown in Figs. 28 and 29. The integral locking device **600** in this case may be centrally-located, with a locking plunger **602** integrally molded into the first lid **16** (e.g., the overlapping lid that covers and secures the second lid **14** when the lids are closed). The locking plunger **602** may include a shaft portion **604** and an enlarged portion **610**, which may likewise be integrally molded with each other and the lid **16**. The enlarged portion **610** may define a locking surface **670** proximate the joining of the shaft portion the enlarged portion comprises the locking surface **604** to the enlarged portion.

The second lid **14** may in turn define an interior ledge **620** or other lid portion to which a spring **630** and locking shuttle **640** are attached, as shown in Fig. 29. The locking shuttle **640** may define a locking aperture **645** configured to partially surround the shaft portion **604** and engage the locking surface **670**, thereby preventing passage of the enlarged portion through the locking aperture in the locked position. For example, the locking aperture **645** may have an arcuate shape, as shown in Fig. 29A, that is configured to substantially match the dimensions of the shaft portion **604**. At the same time, the enlarged portion **610** of the plunger **602** may be larger than the locking aperture **645** and may, thus, be secured in a locked position when the shuttle **640** is engaged with the locking surface **670**.

The spring **630** may be configured to bias the shuttle **640** into engagement with the plunger **602** (i.e., the locked position). The biasing force of the spring **630**, however, may be overcome by the application of a magnetic key **122** to the exterior of the second lid **14**. More specifically, the shuttle **640** may be comprised of or may include a magnetic element **641** (in Fig. 29A) that is moveable between the locked position and an unlocked

position, such that the shuttle is attracted to and follows the movement of the magnetic key **122**, and the magnetic element and shuttle may thus be spring biased in the locked position. The magnetic element **641** may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element and moving the magnetic key in the direction of the unlocked position. Thus, by applying the key **122** to the exterior of the lid **14** and moving the key in the direction of the arrow **650**, the shuttle **640** is also moved in the direction of the arrow, overcoming the biasing force of the spring **630** and further compressing the spring **630**. With the shuttle **630** held in the unlocked position by the magnetic key **122**, as shown in Fig. 30, the user is able to open the lids **14**, **16** as the locking aperture **645** is no longer restricting the movement of the locking plunger **602**.

Once the key **122** is removed, the biasing force of the spring **630** urges the shuttle **640** back into the locked position. When the lids **14**, **16** are open, the locking plunger **602** is displaced from the shuttle **640**, and the locking aperture **645** cannot engage the plunger. Thus, the shuttle **640** may be configured to allow the enlarged portion **610** of the locking plunger **602** to pass through the locking aperture **645** in one direction (i.e., to engage the plunger with the shuttle as the lids are closed), but not in the other direction (i.e., to disengage the plunger from the shuttle). For example, as shown in Fig. 29, the shuttle **640** may be configured to define a tapered surface, such that as the locking plunger **602** is moved towards the shuttle (i.e., the lids are being closed), the enlarged portion **610** of the plunger can ride along the tapered surface of the shuttle and displace the shuttle, pushing the shuttle towards the unlocked position just enough to clear the shuttle (i.e., the locking aperture **645** of the shuttle) and allow the locking aperture to partially surround the shaft portion and engage the locking surface. Once the enlarged portion **610** is clear of the shuttle **640**, the shuttle and locking aperture **645** are moved into engagement with the shaft portion **604** and the locking surface **670**, and the lids are thus secured.

In still other embodiments, an integral locking device **700** may be provided as shown in Figs. 31–33B. The integral locking device **700** in this case may be configured to lock one of the lids (i.e., the first lid **16**) on two sides of the tote bin to secure both of the lids **14**, **16** via a single lock housing **704**. In other words, the one lock housing **704**, which may be located proximate one of the sides of the tote bin, as shown in Fig. 31, may be configured to control the engagement and disengagement of locking mechanisms at two lock points **701**, **703** at either end of the tote bin.

Referring to Figs. 31, 32A, and 32B, the integral locking device **700** may include a connecting bar **702**, which extends along the lid **16** between two lock points **701**, **703**. Proximate the first lock point **701**, the connecting bar **702** may be configured to have a

"U" shape. Thus, at the first lock point **701**, the connecting bar **702** may define a first locking portion **710** and grasping portion **712** that the user can grasp to slide the connecting bar **702** into the disengagement position, as described in greater detail below. The body portion **12** of the container may in turn define a first receiving cavity **740** that is configured to receive the first locking portion **710** when the connecting bar **702** is in the locked position, as shown in Fig. 32A. A main portion **750** of the connecting bar **702**, from which the grasping portion **712** and first locking portion **710** extend, may slidingly extend through a channel defined in the lid **16** to connect the first lock point **701** with the second lock point **703**, as mentioned above.

Turning to Figs. 33A and 33B, proximate the second lock point **703**, the connecting bar **702** may define a second locking portion **711** that is configured to be received in a second receiving cavity **741** defined by the body portion **12** at an opposite end of the tote bin. Thus, whereas the first locking portion **710** is external to the tote bin (i.e., enters the first receiving cavity **740** from outside the tote bin), the second locking portion **711** is internal to the tote bin (i.e., enters the second receiving cavity **741** from inside the tote bin). The second locking portion **711** extends from the main portion **750** of the connecting bar **702**, and the lid **16** is configured to allow the sliding movement of the main portion **750** and second locking portion **711** into and out of engagement with the second receiving cavity **741**. Thus, only grasping portion **712** may be accessible to the user when the connecting bar **702** is in the retracted position.

Turning again to Figs. 32A and 32B, the main portion **750** of the connecting bar **702** may define a notch **707** configured to receive the engagement surface of a locking slider **706** similar to the locking sliders of the previously described embodiments. Thus, when the locking slider **706** is received within the notch **707**, the connecting bar **702** cannot be moved and is fixed in position. The notch **707** is positioned along the connecting bar **702** such that when the locking slider **706** is received within the notch **707**, the first and second locking portions **710**, **711** are received by the first and second receiving cavities **740**, **741**, respectively, and the lid **16** (and, as a result, the underlying lid **14**) is secured to the body portion **12** of the tote bin, as shown in Figs. 32A and 33A. In other words, the tote bin is in the locked configuration.

The locking slider **706** may be attached to a spring **730** within the lock housing **704**, and the spring may be configured to bias the locking slider into engagement with the connecting bar **702**. The locking slider may include a magnetic element as described above in connection with other embodiments that is moveable between the locked position and an unlocked position, such that the magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element. Thus, when the tote bin is

locked as shown in Fig. 32A, a user may unlock the locking device **700** by applying a magnetic key **122** to the exterior of the lock housing **704** to attract the locking slider **706** out of engagement with the notch **707**, thereby allowing the user to grasp the grasping portion **712** and slide the connecting bar **702** to the extracted position such that the first and second locking portions **710**, **711** are pulled out of engagement with the first and second receiving cavities **740**, **741**, as shown in Figs. 32B and 33B, unlocking the lid **16** from the body portion **12** of the tote. At this point, the lids **14**, **16** can be opened and the interior of the tote bin can be accessed.

When the user wishes to secure the tote bin once more, the lids **14**, **16** may be closed, and the connecting bar **702** may be pushed from the extracted position to the retracted position via the grasping portion **712**. The locking slider **706** may be configured to allow the movement of the connecting bar **702** towards the retracted position even when the magnetic key **122** is not applied and the force of the spring **730** is pushing the locking slider into the connecting bar (e.g., the engagement surface of the locking slider **706** may be tapered). In this way, the user can simply push the connecting bar **702** via the grasping portion **712** until the notch **707** aligns with the locking slider **706** and is engaged, thereby locking both lock points of the tote bin substantially simultaneously.

In one or more of the embodiments discussed above, the locking device may further include anti-theft features configured to provide one or more alerts in the event the locking device on the tote bin is bypassed or the tote bin is moved out of a specified area. For example, the anti-theft features may provide one or more of the following alerts: (1) activation of an alarm (audible and/or visual) at the location of a security gate (i.e., a gate alarm) when the tote bin is physically moved through the security gate; (2) activation of an alarm (audible and/or visual) actually located on or attached to the tote bin when the tote bin is physically moved through the security gate; and (3) activation of an alarm (audible and/or visual) on the tote bin when an attempt has been made to tamper with or bypass the locking device. Details regarding methods and devices for providing such three alarm security are described in U.S. Publication No. 2006/0145848 entitled "Electronic Security Device and System for Articles of Merchandise," U.S. Patent No. 7,474,209 entitled "Cable Alarm Security Device," and U.S. Patent No. 7,497,101 entitled "Cable Wrap Security Device," the contents of each of which are incorporated by reference herein.

With reference to Fig. 34, a locking device **800** (which may be any one of the locking devices described above) is shown as having a lock housing **804** that includes a security element in a chamber **850** of the lock housing **804**. The security element may be one of any number of devices that is configured to be detected by a security system such as an RFID transponder (e.g., an active tag, a passive tag, etc.) or an Electronic Article Surveillance (EAS) element. Considering the example of an EAS element **905**, shown in

Fig. 34, the EAS element may be configured to be detectable when the EAS element is present in a predetermined detection zone, such as a zone set up at or near the door or other entrance point of a warehouse or distribution center. The EAS element may be configured to work within an EAS security system. For example, the EAS element may include a magnetic tag, such as those used in an electromagnetic (EM) system or in an acousto-magnetic (AM) system. As another example, the EAS element may be configured work within a microwave system.

Referring to Figs. 34 and 35, in some cases, the lock housing **804** may include other security or alarm features. For example, the lock housing **804** may have an audible alarm device, such as a piezoelectric speaker **910**, which may be triggered in response to one or more circumstances. In some embodiments, the lock housing **804** may thus include a printed circuit board **915** with a logic circuit **930**, a sense loop **925** configured to detect a fault condition associated with the locking device (i.e., tampering with or bypassing the locking device), and/or an energy source **911**, such as a battery. The logic circuit may be disposed in communication with at least a portion of the elongate lock member or other components of the locking device described in various embodiments above to form a sense loop configured to detect a fault condition associated with the locking device **800**. In this way, any discontinuity (e.g., cutting of the cable in Fig. 16 or unexpected movement of the latch pin **102** in Fig. 8) in the sense loop may be recognized as a fault condition, which triggers alarm functionality as described in greater detail below.

Thus, according to the embodiments shown in Figs. 34 and 35, the lock housing **804** may include components that provide 1-alarm (e.g., alarming by a security gate at the security gate when the container is improperly moved past the gate), 2-alarm (e.g., alarming at the security gate when the container is moved and alarming by the locking device at the container when the locking device is tampered with or compromised), or 3-alarm (e.g., alarming at the security gate when the container is moved and alarming by the locking device at the container when the locking device is tampered with or compromised and alarming by the locking device at the container when the container is improperly moved past the security gate) functionality to the container.

In other embodiments, it may be desirable to minimize the size of the lock housing and, thus, some components and circuitry necessary to facilitate the above referenced alarm functionality may be housed in a security module **1000**. The security module **1000** may be configured to be releasably attached to the lock housing **804**. In one embodiment, the security module **1000** may be attached to the outside of the lock housing **804** as shown in Fig. 36.

As will be apparent to one of ordinary skill in the art in view of this disclosure, the security module **1000** may be designed to provide added alarm functionality that might

not be desired in a base level or "stock" locking device. For example, in one embodiment, a stock locking device may be equipped simply with an EAS element and, thus, may be capable on its own of only 1-alarm functionality (e.g., triggering an alarm by an EAS gate security gate at the security gate when the locking device is improperly moved past the gate). The security module **1000** may be designed as a complimentary add-on component that is configured to provide 2-alarm (e.g., triggering an alarm by the locking device at the locking device/container when the locking device is tampered with or compromised) and/or 3-alarm functionality (e.g., triggering an alarm by the locking device at the locking device/container when the container is improperly moved past the security gate).

The security module **1000** may include a printed circuit board **1015** that includes a logic circuit **1030** for supporting various functions of the security module. In one embodiment, the logic circuit **1030** may be disposed in communication with at least a portion of the elongate lock member or other components of the locking device described in various embodiments above to form a sense loop configured to detect a fault condition associated with the locking device **800**. In this way, a discontinuity (e.g., cutting of the cable in Fig. 16) or change (e.g., unexpected movement of the latch pin **102** in Fig. 8) in the sense loop may be recognized as a fault condition, which triggers alarm functionality.

The security module **1000** may also include a light-emitting diode (LED) **1020**, and/or an energy source **1011**. In embodiments including an LED, the LED **1020** may be in electrical communication with the logic circuit **1030** of the printed circuit board **1015** and the energy source and may extend at least partially through an opening defined by the exterior of the security module **1000** such that at least a portion of the LED is visible to the user or consumer (as shown in Figs. 37 and 38). The LED **1020** may be used as an indicator (e.g., by providing a constant light or a blinking on/off light) of the existence of a particular condition or circumstance. For example, the LED **1020** may indicate that the security module **1000** has power, that the locking device **800** is in the locked configuration, that the security module is armed, or that the alarm has been triggered.

As noted above, the alarm components of the lock housing **804** and/or security module **1000** may be configured to activate in the event that a portion of the locking device **800** or security module has been compromised, such as by being cut or damaged. For example, in some embodiments such as those shown and described in connection with Figs. 12–22, the cable of the locking device may include or may itself be an electrically conductive element and may form a sense loop **925**, **1025** in communication with the logic circuit **930**, **1030** (e.g., a chip) of the lock housing **804** or security module **1000**, as shown in Figs. 35 and 36. Thus, in event that the cable is compromised, for example, the logic circuit **930**, **1030** may be configured to detect the change in the cable

and respond by activating the alarm (e.g., directing the speaker **910**, **1010** to issue an audible alert).

In some embodiments, the security module **1000** may be deactivated by authorized users in order to transport the tote bin out of the secured area without setting off the alarms. Depending on the particular configuration of the security module **1000**, the module may be detached from the lock housing **804**, demagnetized, or otherwise neutralized before the tote bin is removed from the designated area.

For example, in Fig. 37, the security module **1000** is releasably attached to the exterior of the lock housing **804**, such as via a magnetic connection. When a user does not require the tote bin to have alarm or security capabilities (for example, when the tote bin is empty or otherwise not in use), the security module **1000** may be detached from the housing **804**, as shown in Fig. 38, for example, via a magnetic key. In this way, the security module **1000** can be interchangeable among a number of tote bins so as to allow the most efficient use of a limited number of security modules.

In some embodiments, some of the alarm components may be provided in the lock housing **804**, whereas other components may be provided in the security module **1000**. Thus, with reference to Figs. 38 and 39, the lock housing **804** may include contacts **870**, 8**75** on an exterior portion of the housing (shown in Fig. 37) that allow alarm components included in the security module **1000** (such as the printed circuit board **1015** and logic circuit **1030**) to be in communication with alarm components included in the lock housing (such as the security element **905**). In this way, the lock housing **804** may be configured to include only some of the alarm components, for example an EAS element **905**, providing limited alarm capabilities to the container (e.g., 1-alarm functionality) on its own, whereas other alarm components, such as the logic circuit **1030**, speaker **1010**, LED **1020**, energy source **1011**, etc., may be included in the security module **1000**. Thus, the joining of the security module **1000** with the lock housing **804** may form the sense loop **1025** and communicate with the alarm components of the lock housing to provide additional alarm capabilities to the container via the contacts **870**, **875**, while at the same time allowing the enhanced alarm functionality of the security module to be interchangeable among different containers.

In some cases, the lock housing **804** is configured to include a button (not shown) on the exterior of the housing that is configured to provide additional security functionality. For example, the attachment of the security module **1000** to the lock housing **804** may depress the button, thereby arming the alarm. Thus, unauthorized removal of the security module **1000** (e.g., removing the security module from the lock housing without the magnetic key that serves to disarm the alarm) would cause the button to release, which

would be sensed by the logic circuit and trigger an audible or other alarm to alert personnel of the unauthorized activity.

As another example, the logic circuit may be configured to detect when a security element is disposed in alarm proximity to a security gate. In EAS embodiments, the logic circuit may be configured to detect excitation of an EAS element housed within the lock housing or security module. In RFID embodiments, the logic circuit may be configured to detect a power up condition or signal generated by an RFID transponder housed within the lock housing or security module. Upon such detection, the logic circuit may be configured to initiate an alarm (e.g., audio alarm, visual alarm, or send a signal to a remote network entity or server).

In one embodiment, a speaker **910**, **1010** may be housed within the lock housing **804** and/or security module **1000**. Thus, when unauthorized movement of the locking device is detected, an audible alarm may be triggered by the locking device at the locking device in addition to any audible alarm that may be triggered at the security gate. In this way, personnel may be able to locate the tote bin as it is transported away from the secured area, thereby facilitating the recovery of the stolen goods.

In other embodiments, various other alarm indicators may be provided by the locking device and/or security gate. For example, each may further include components for providing visual alerts (e.g., LED indicators, strobe lights, high intensity lights, etc.) along with the audible alerts provided by the respective speakers. The locking device and/or security gate may further be configured with circuitry and communication components (i.e., wireless radio, etc.) for sending an alert signal to a remote network entity (i.e., controller or server).

As mentioned above, the security element **905** may include various types of wireless devices including RFID transponders or tags. Such RFID tags may be used to store and/or communicate information about objects stored in the tote bins for security or inventory control purposes. In some embodiments, a locking device structured in accordance with various embodiments may include a configurable monitoring device (supported in the lock housing or as an attached security module) as described in commonly owned U.S. Provisional Application Nos. 61/244,320, 61/246,388, and 61/248,223, which are incorporated by reference herein in their entirety. Such configurable monitoring device equipped locking devices are referred to herein as "tote CMDs" and may be used for locating the tote for inventory control and security purposes. The tote CMDs may also be configured to detect the presence of RFID tags (e.g., passive or active) and associated products within the tote. Thus, a tote CMD may operate similar to a node, with respect to the RFID tags stored within the tote. A tote CMD configured to operate as a node may therefore enable communication with nearby RFID tags, detection

of the presence of nearby RFID tags, tracking of nearby RFID tags, relaying of configuration information to RFID tags or other nodes, and other functions. Tote CMDs may also be configured to communicate with other nodes provided at various other strategic locations (for example, within a warehouse environment) in which the presence of a CMD (and its corresponding product) should be noted, monitored or tracked.

In some embodiments, the tote CMDs may maintain an inventory of the products within the tote by virtue of communication with each respective tagged product in the tote and the extraction and/or storage of product related information associated with each respective tag. For example, as the tote moves from the warehouse to a destination store, the inventory information may be verified at both locations to ensure that the contents of the tote have not been tampered with or stolen. Furthermore, after acceptance of the tote and verification of the contents of the tote, an entirety of the contents of the tote may automatically be uploaded into the inventory of the receiving store.

The tote CMD may also interface with a key, such as a manager's key. In this regard, the key may be enabled to deactivate security functionality of the tote tag, such as the alarm functionality discussed above. The tote CMD may be configured to alarm if an attempt is made to open the tote without the key or with an unapproved key. The tote CMD may also alarm if communication is lost with the tag of one or more of the tagged products within the tote. A key may be configured to interface with the tote CMD, either directly or through the monitoring system, to deactivate, or activate, the tote tag's alarming functionality. The monitoring system, or the tote CMD may be configured to manage access to the contents of the tote by, for example, maintaining a list identifying the particular keys or the types of keys (e.g., high level manager's key) that have been enabled to open the tote. In the event that an unapproved key is used, or is attempted to be used, for opening a tote, the tote CMD may alarm. In some cases, the manager's key may also include a physical or electronic key capable of opening the actual tote locking device **800** that secures the tote.

For example, a special authorization code, called a tote code, may be assigned to the tote. Before the tote is shipped from a first location (such as a distributor or manufacturer) to a second location (such as a retail store), the tote code can be used to lock the tote CMD affixed thereto. Upon arrival at the second location, the tote may not be opened like other tote CMDs or locking devices. For example, the manager's key may not be able to decommission and unlock the tote CMD, even if the manger's key has the highest level of authorization. Rather, the manager's key may need to be dynamically updated with the appropriate tote code. The tote code can be passed via a public Internet, closed network, flash memory drive, or by any other electronic means. Similarly,

if the tote code is a series of numbers and letters, the first location manager can telephone the second location manager and verbally deliver the tote code. The second location manager may then enter the tote code into his already activated manager's key and use the manager's key to decommission and unlock the tote.

Many modifications and other embodiments of the invention set forth herein will come to mind to one skilled in the art to which the invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

WHAT IS CLAIMED IS:

1. A locking device for locking a container having sidewalls and at least one lid defining an open position and a closed position, the locking device comprising:

an elongate lock member configured to engage one of the at least one lid or at least one of the sidewalls; and

a lock housing associated with the other of the at least one lid or the at least one of the sidewalls, wherein the lock housing is configured to at least partially receive the elongate lock member, and wherein the lock housing comprises:

a lock assembly defining a locked position, wherein, in the locked position, the lock assembly is configured to engage the elongate lock member and secure the at least one lid in the closed position, and

a security element.

2. The locking device of Claim 1, wherein the security element is selected from the group consisting of an RFID transponder and an EAS element.

3. The locking device of Claim 1, wherein the lock housing further comprises an audible alarm device and an energy source.

4. The locking device of Claim 1, wherein the lock housing further comprises an audible alarm device, an energy source, and a sense loop configured to detect a fault condition associated with the locking device.

5. The locking device of Claim 1 further comprising a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device and an energy source.

6. The locking device of Claim 1 further comprising a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device, an energy source, and a logic circuit disposed in communication with at least a portion of the elongate lock member to form a sense loop configured to detect a fault condition associated with the locking device.

7. The locking device of Claim 1, wherein the elongate lock member is configured to engage the at least one lid, and the lock housing is securely fastened to the at least one of the sidewalls.

8. The locking device of Claim 7, wherein the container defines a handle, and wherein the lock housing is securely fastened to the at least one of the sidewalls proximate the handle.

9. The locking device of Claim 1, wherein the elongate lock member is configured to engage the at least one lid, and wherein the at least one of the sidewalls at least partially forms the lock housing.

10. The locking device of Claim 1, wherein the elongate lock member defines a locking surface, and wherein the lock assembly comprises a locking spring defining engaging ends that are biased to engage the locking surface of the elongate lock member.

11 The locking device of Claim 1, wherein the elongate lock member defines a locking surface, and wherein the lock assembly comprises a locking slider that is spring biased to engage the locking surface of the elongate lock member.

12. The locking device of Claim 1, wherein the elongate lock member comprises a flexible cable defining a locking surface, and wherein the lock assembly is configured to engage the locking surface of the flexible cable when the lock assembly is in the locked position.

13. The locking device of Claim 12, wherein the flexible cable is movable from an extracted position to a retracted position, and wherein the lock assembly is configured to engage the locking surface of the flexible cable when the flexible cable is in the retracted position.

14. The locking device of Claim 13, wherein a retraction force is required to drive the flexible cable from the extracted position to the retracted position.

15. The locking device of Claim 14, wherein the flexible cable defines a driving element configured to be grasped by a user when applying the retraction force.

16. The locking device of Claim 14, wherein the at least one lid comprises a cable retaining element configured to frictionally resist movement of the flexible cable from the extracted position to the retracted position.

17. The locking device of Claim 14, wherein the flexible cable defines a drive rigidity for reducing buckling of the flexible cable when the retraction force is applied.

18. The locking device of Claim 1, wherein the container comprises a first lid and a second lid, and wherein the elongate lock member is configured to engage and secure the first lid and the second lid in the closed position when the lock assembly is in the locked position.

19. The locking device of Claim 1, wherein the elongate lock member comprises a rigid member defining a locking surface, wherein the locking surface comprises a protrusion, and wherein the lock housing comprises a locking slider configured to engage the protrusion when the lock assembly is in the locked position.

20. The locking device of Claim 1, wherein the container comprises a first lid and a second lid, and wherein the elongate lock member is configured to engage and secure the first lid and the second lid in the closed position when the lock assembly is in the locked position.

21. The locking device of Claim 20, wherein the elongate lock member is configured to remain with the first lid when the elongate lock member is in an extracted position and the first lid is in the open position.

22. A locking device for locking a container having sidewalls and at least one lid defining an open position and a closed position, the locking device comprising:

a latch pin configured to engage the at least one lid and defining a locking surface;

a lock housing associated with at least one of the sidewalls, wherein the lock housing is configured to at least partially receive the latch pin, and wherein the lock housing comprises:

a locking slider defining a locked position and having an engagement surface, wherein the engagement surface is configured to engage the locking surface of the latch pin and secure the at least one lid in the closed position when the locking slider is in the locked position, and

a security element.

23. The locking device of Claim 22, wherein the security element is selected from the group consisting of an RFID transponder and an EAS element.

24. The locking device of Claim 22, wherein the lock housing further comprises an audible alarm device and an energy source.

25. The locking device of Claim 22, wherein the lock housing further comprises an audible alarm device, an energy source, and a sense loop configured to detect a fault condition associated with the locking device.

26. The locking device of Claim 22 further comprising a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device and an energy source.

27. The locking device of Claim 22 further comprising a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device, an energy source, and a logic circuit disposed in communication with at least a portion of the elongate lock member to form a sense loop configured to detect a fault condition associated with the locking device.

28. The locking device of Claim 22, wherein the locking surface comprises notches configured to engage the engagement surface of the locking slider.

29. The locking device of Claim 22, wherein the locking slider comprises a magnetic element that is moveable between the locked position and an unlocked position, and wherein the magnetic element is spring biased in the locked position.

30. The locking device of Claim 29, wherein the magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element.

31. The locking device of Claim 22 further comprising a frictional element configured to fit around the latch pin and to provide an interference fit between the latch pin and a hole defined by one of the at least one lid through which the latch pin passes, wherein the frictional element is configured to frictionally resist movement of the latch pin from an extracted position to a retracted position.

32. A locking device for locking a container having sidewalls and at least one lid defining an open position and a closed position, the locking device comprising:

a flexible cable configured to engage the at least one lid and defining a locking surface; and

a lock housing associated with at least one of the sidewalls, wherein the lock housing is configured to at least partially receive the flexible cable, and wherein the lock housing comprises:

a locking slider defining a locked position and having an engagement surface, wherein the engagement surface is configured to engage the locking surface of the latch pin and secure the at least one lid in the closed position when the locking slider is in the locked position, and

a security element.

33. The locking device of Claim 32, wherein the security element is selected from the group consisting of an RFID transponder and an EAS element.

34. The locking device of Claim 32, wherein the lock housing further comprises an audible alarm device and an energy source.

35. The locking device of Claim 32, wherein the lock housing further comprises an audible alarm device, an energy source, and a sense loop configured to detect a fault condition associated with the locking device.

36. The locking device of Claim 32 further comprising a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device and an energy source.

37. The locking device of Claim 32 further comprising a security module configured to be releasably attached to the lock housing, wherein the security module comprises an audible alarm device, an energy source, and a logic circuit disposed in communication with at least a portion of the elongate lock member to form a sense loop configured to detect a fault condition associated with the locking device.

38. The locking device of Claim 32, wherein the locking surface comprises at least one ferrule configured to engage the engagement surface of the locking slider.

39. The locking device of Claim 32, wherein the locking slider comprises a magnetic element that is moveable between the locked position and an unlocked position, and wherein the magnetic element is spring biased in the locked position.

40. The locking device of Claim 39, wherein the magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element.

41. The locking device of Claim 32, wherein the flexible cable is movable from an extracted position to a retracted position, and wherein the lock assembly is configured to engage the locking surface of the flexible cable when the flexible cable is in the retracted position.

42. The locking device of Claim 41, wherein a retraction force is required to drive the flexible cable from the extracted position to the retracted position.

43. The locking device of Claim 42, wherein the flexible cable defines a driving element configured to be grasped by a user when applying the retraction force.

44. The locking device of Claim 42, wherein the flexible cable defines a drive rigidity for reducing buckling of the flexible cable when the retraction force is applied.

45. The locking device of Claim 42 further comprising a guide element fixedly disposed within the at least one sidewall associated with the locking housing and at least partially surrounding the flexible cable when the flexible cable is in the retracted position, wherein the guide element is configured to direct the flexible cable towards the lock housing as the flexible cable is driven from the extracted position to the retracted position.

46. The locking device of Claim 45, wherein the guide element is configured to shield at least part of the flexible cable when the flexible cable is in the retracted position.

47. The locking device of Claim 32, wherein the at least one lid comprises a cable retaining element configured to frictionally resist movement of the flexible cable from an extracted position to a retracted position.

48. The locking device of Claim 32, wherein the container comprises a first lid and a second lid, and wherein the flexible cable is configured to engage and secure the first lid and the second lid in the closed position when the locking slider is in the locked position.

49. The locking device of Claim 32, wherein the lock housing is securely fastened to the at least one of the sidewalls.

50. The locking device of Claim 49, wherein the container defines a handle, and wherein the lock housing is securely fastened to the at least one of the sidewalls proximate the handle.

51. The locking device of Claim 32, wherein the at least one of the sidewalls at least partially forms the lock housing.

52. A locking device for locking a container having sidewalls, a first lid, and a second lid, the first and second lids defining an open position and a closed position, the locking device comprising:

a locking extension extending from the first lid, the locking extension defining a locking surface; and

a receiving cavity formed in the second lid, wherein the receiving cavity is configured to receive the locking extension as the first and second lids are moved from the open position to the closed position, wherein the receiving cavity comprises a locking spring defining engaging ends that are configured to engage the locking surface as the locking extension is received into the receiving cavity.

53. The locking device of Claim 52, wherein the locking surface comprises notches defined in the locking extension.

54. The locking device of Claim 52, wherein the engaging ends of the locking spring comprise magnetic elements that are moveable between a locked position and an unlocked position, and wherein the magnetic elements are spring biased in the locked position via the locking spring.

55. The locking device of Claim 54, wherein the magnetic elements may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic elements.

56. The locking device of Claim 52, wherein the locking extension is configured to flex to accommodate an arcuate joining of the locking extension with the receiving cavity as the respective lids are moved from the open position to the closed position.

57. A locking device for locking a container having sidewalls, a first lid, and a second lid, the first and second lids defining an open position and a closed position, the locking device comprising:

a locking plunger extending from the first lid, the locking plunger defining a locking surface;

a lock housing associated with the second lid, wherein the lock housing comprises a locking shuttle defining an engagement surface configured to engage the locking surface, wherein the locking shuttle is configured to move between a locked position and an unlocked position, wherein in the locked position the engagement surface is configured to engage the locking surface.

58. The locking device of Claim 57, wherein the locking shuttle comprises a magnetic element that is moveable between the locked position and an unlocked position, and wherein the magnetic element is spring biased in the locked position.

59. The locking device of Claim 58, wherein the magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element and moving the magnetic key in the direction of the unlocked position.

60. The locking device of Claim 57, wherein the locking plunger comprises a shaft portion extending from the first lid and an enlarged portion disposed at an end of the shaft portion, wherein the enlarged portion comprises the locking surface, and wherein the engagement surface comprises a locking aperture defined by the locking shuttle and is configured to partially surround the shaft portion and engage the locking surface, thereby preventing passage of the enlarged portion through the locking aperture in the locked position.

61. The locking device of Claim 60, wherein the locking shuttle comprises a tapered surface configured such that, when the locking shuttle is in the locked position and the first lid is moved to the closed position, the enlarged portion rides along the tapered surface and displaces the locking shuttle to allow the locking aperture to partially surround the shaft portion and engage the locking surface.

62. A locking device for locking a container having sidewalls and at least one lid, the locking device comprising:

a connecting bar extending along the at least one lid between a first lock point of the container and a second lock point of the container and movable between an extracted position and a retracted position, the connecting bar comprising a first locking portion proximate the first lock point, a second locking portion proximate the second lock point, and a main portion extending between the first locking portion and the second locking portion, wherein the main portion defines a locking surface proximate the first lock point; and

a lock housing formed in the at least one lid proximate the first lock point, wherein the lock housing comprises a locking slider defining a locked position and including an engagement surface configured to engage the locking surface of the main portion when the locking slider in the locked position,

wherein the container sidewalls define a first receiving cavity proximate the first lock point that is configured to receive the first locking portion and a second receiving cavity proximate the second lock point that is configured to receive the second locking portion substantially simultaneously with receipt of the first locking portion by the first receiving cavity when the connecting bar is in the retracted position.

63. The locking device of Claim 62, wherein the locking slider comprises a magnetic element that is moveable between the locked position and an unlocked position, and wherein the magnetic element is spring biased in the locked position.

64. The locking device of Claim 63, wherein the magnetic element may be driven from the locked position to the unlocked position against the spring bias by positioning a magnetic key in magnetic proximity to the magnetic element.

65. The locking device of Claim 62, wherein the locking surface comprises a notch defined by the main portion of the elongate lock member.

66. The locking device of Claim 62, wherein the connecting bar is configured to slide within a channel formed in the at least one lid between the retracted position and the extracted position.

67. The locking device of Claim 62, wherein the connecting bar defines a grasping portion between the main portion and the first locking portion configured to be grasped by a user such that a user can move the connecting bar between the retracted position and an extracted position.

68. The locking device of Claim 67, wherein only the grasping portion is accessible to the user when the connecting bar is in the retracted position.

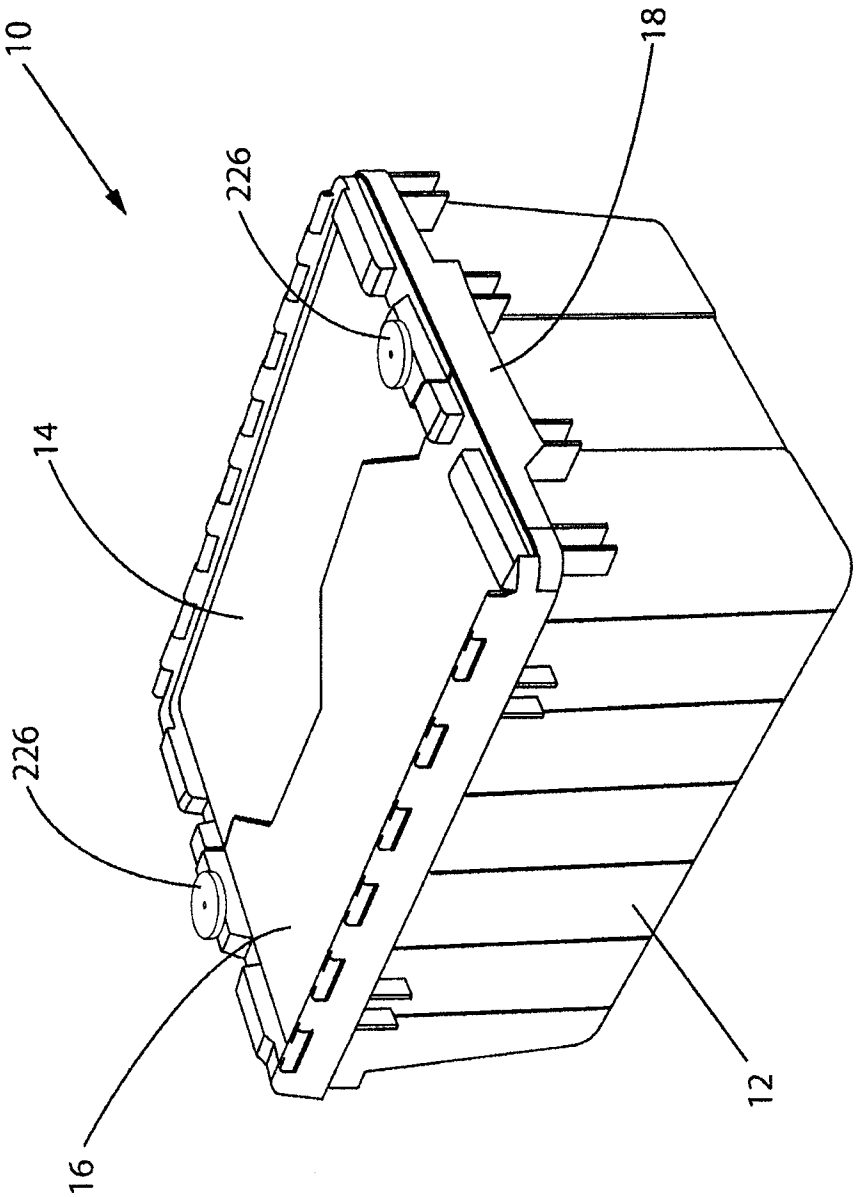

FIG. 1

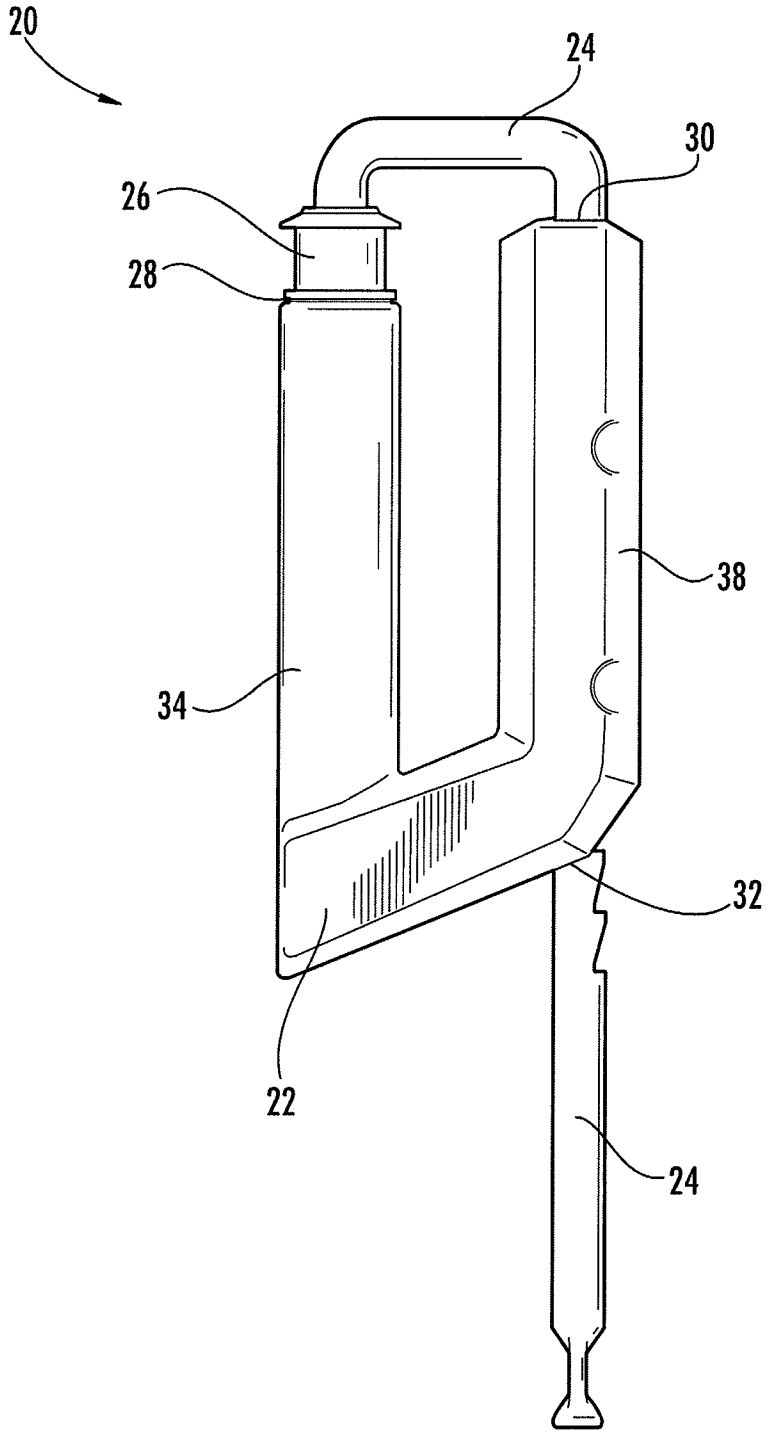

FIG. 2

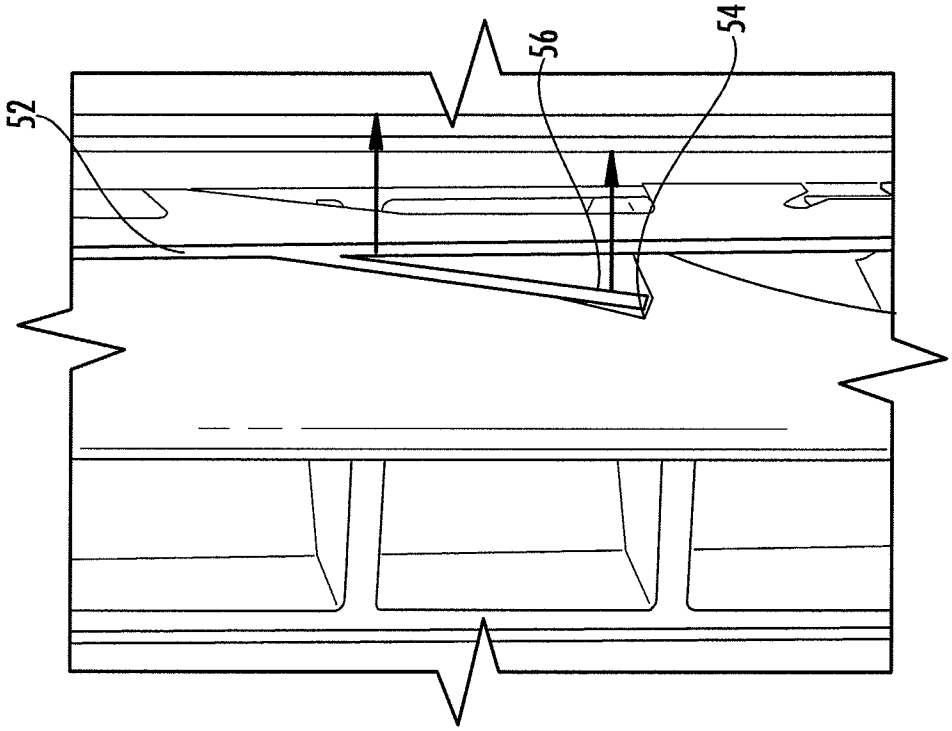

FIG. 4

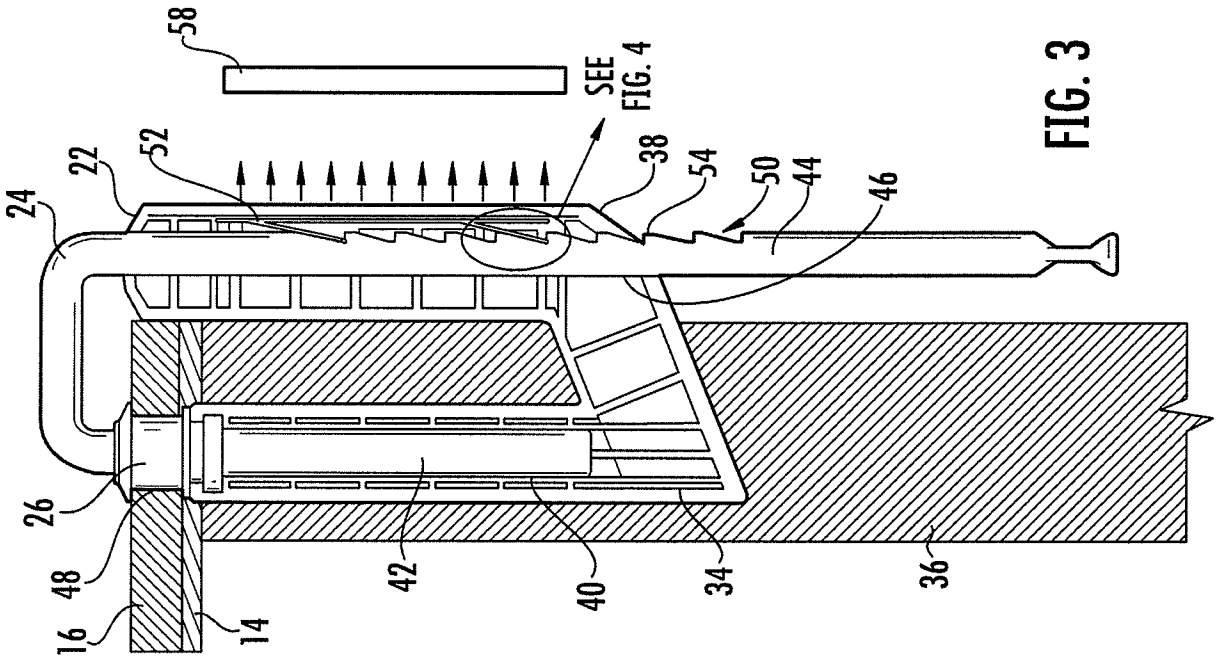

FIG. 3

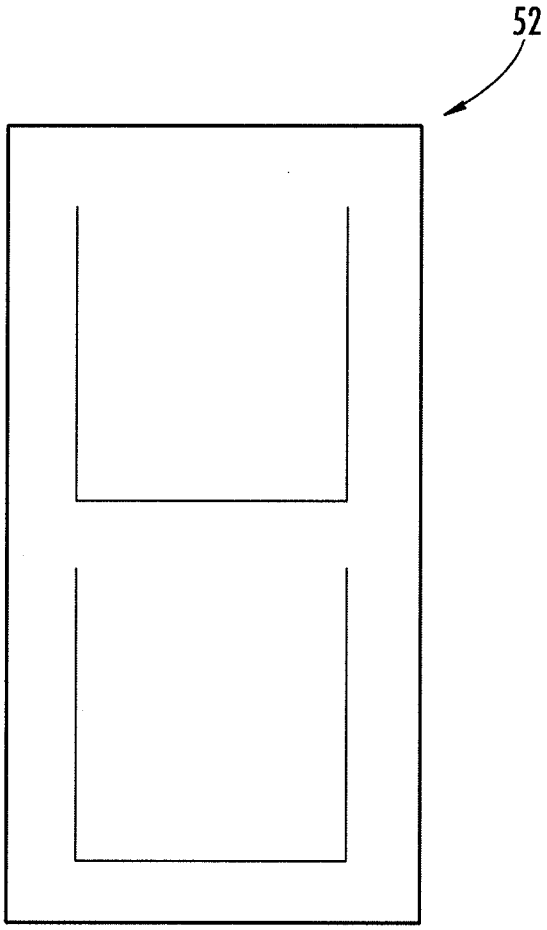

FIG. 5A

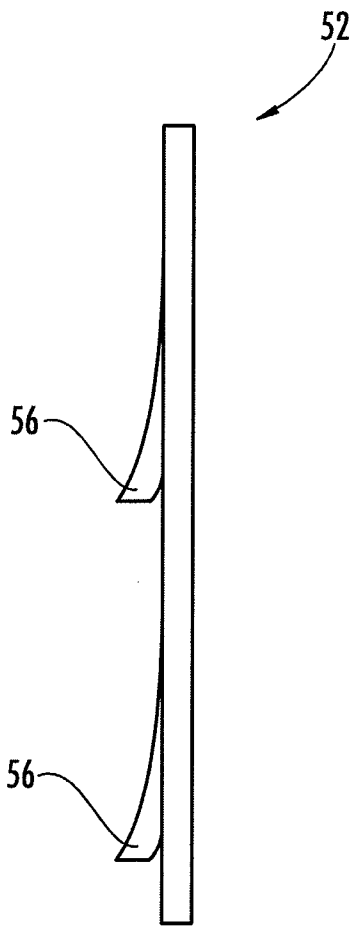

FIG. 5B

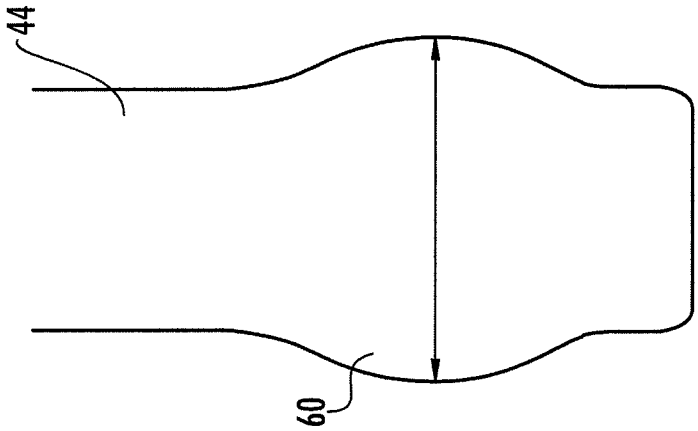

FIG. 6C

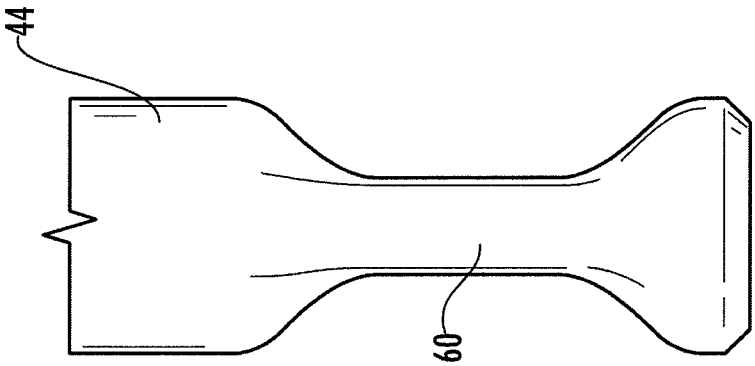

FIG. 6B

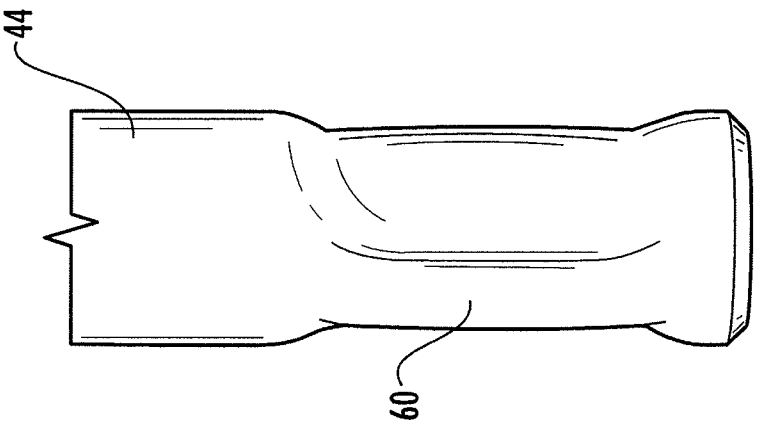

FIG. 6A

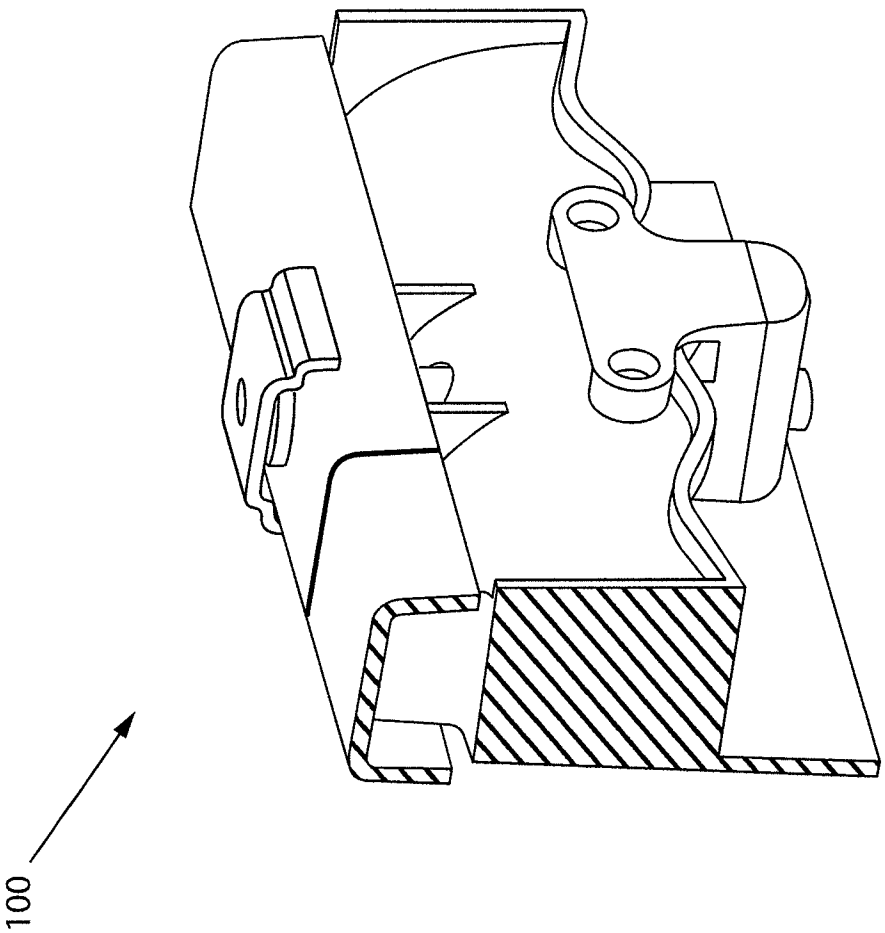

FIG. 7

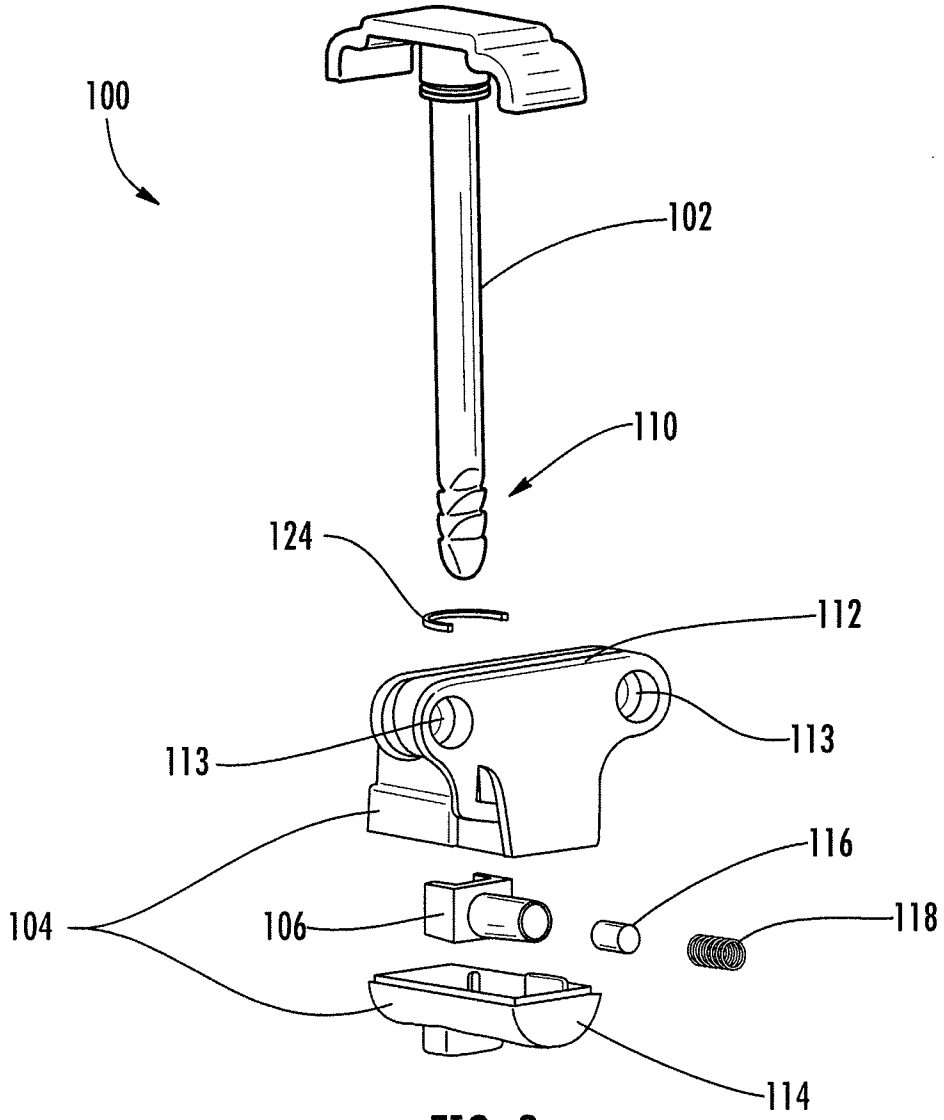

FIG. 8

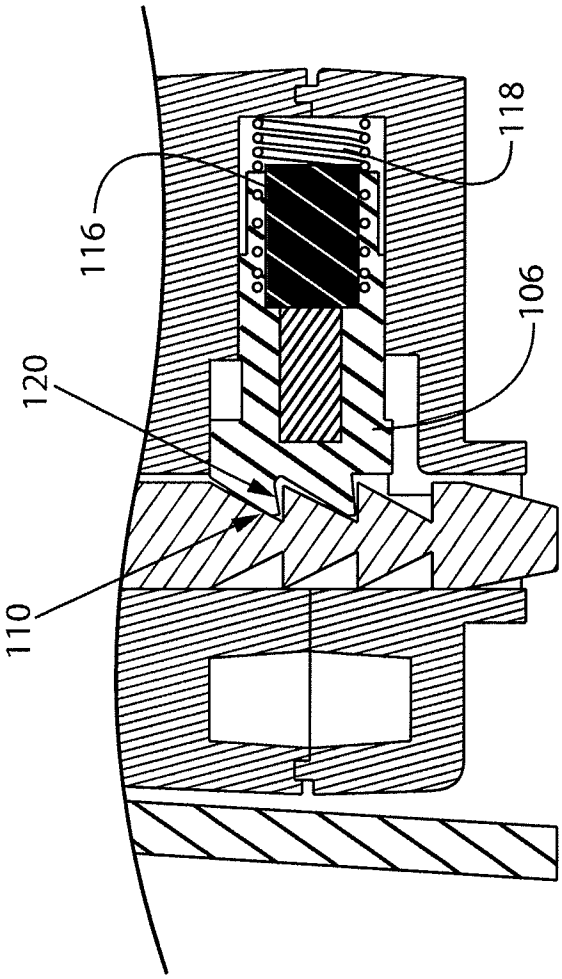

FIG. 10A

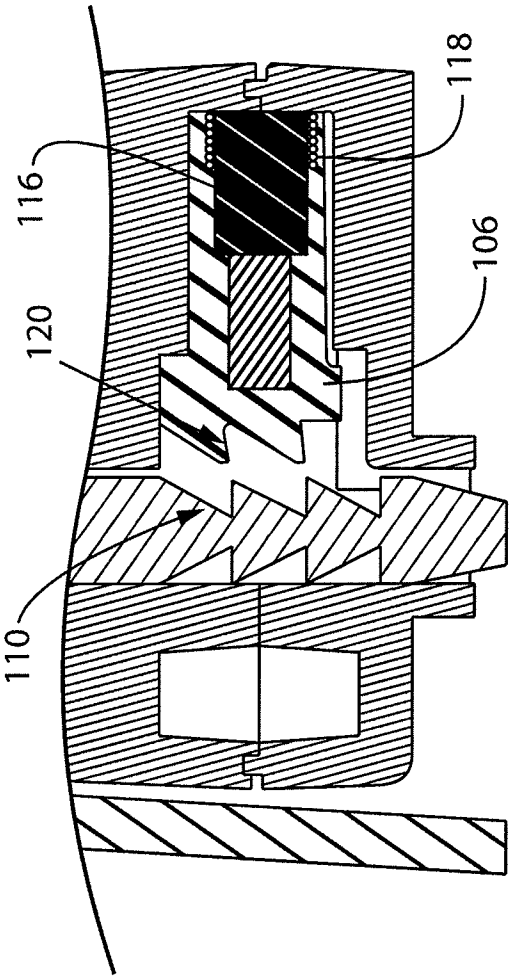

FIG. 10B

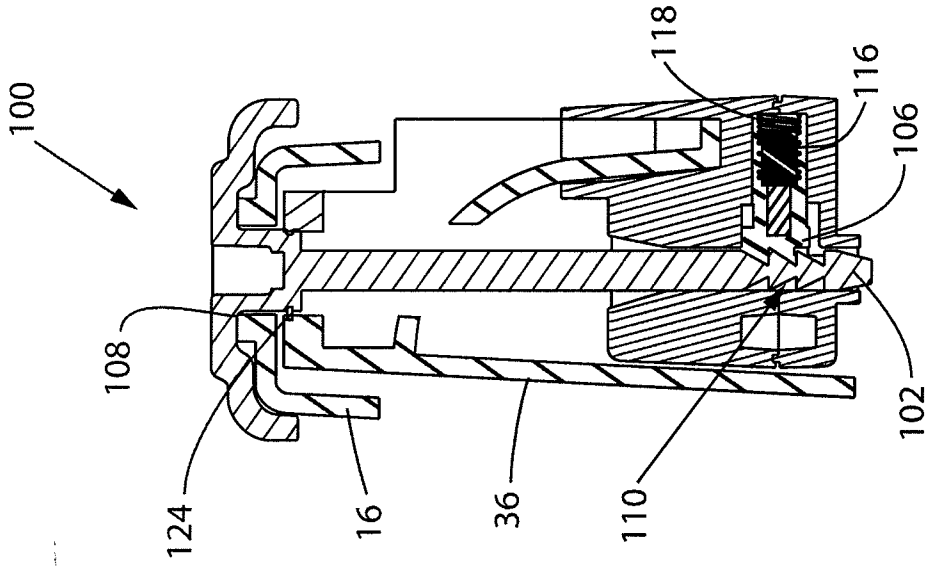

FIG. 9

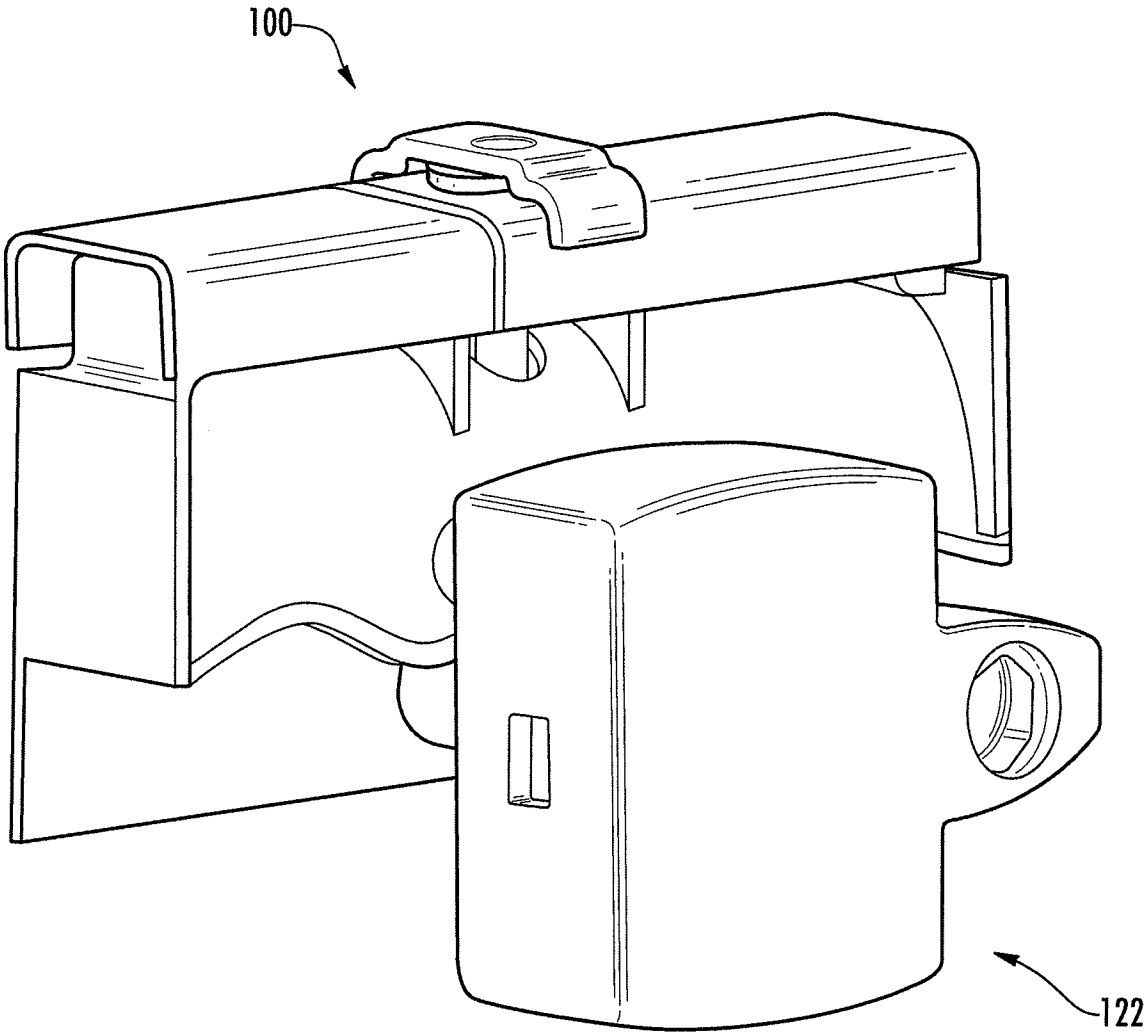

FIG. 11

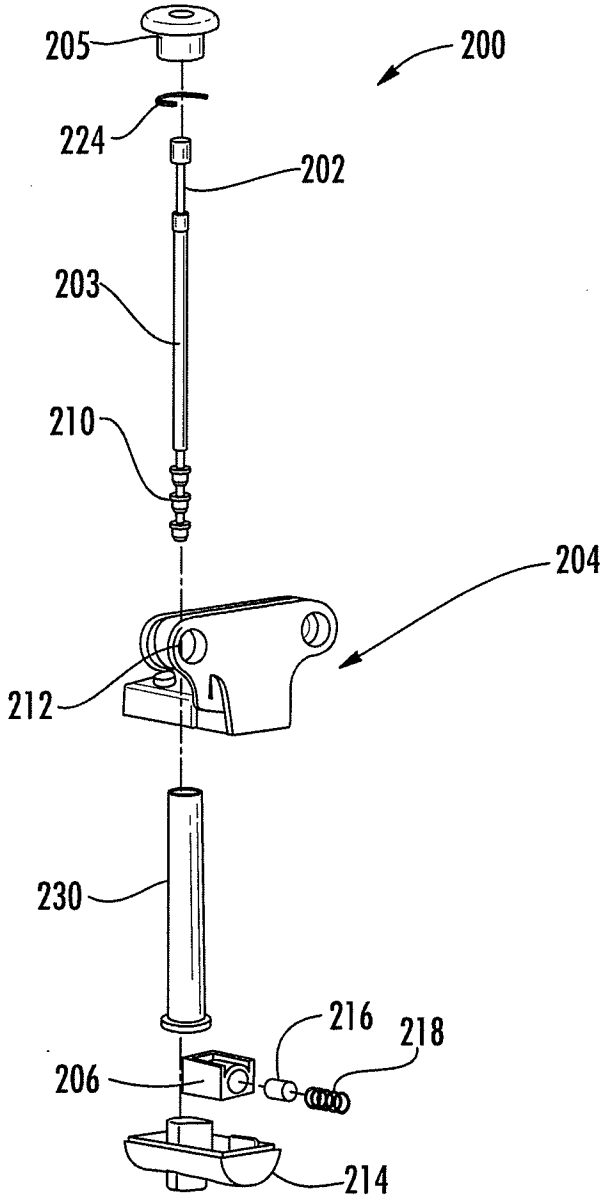

FIG. 12

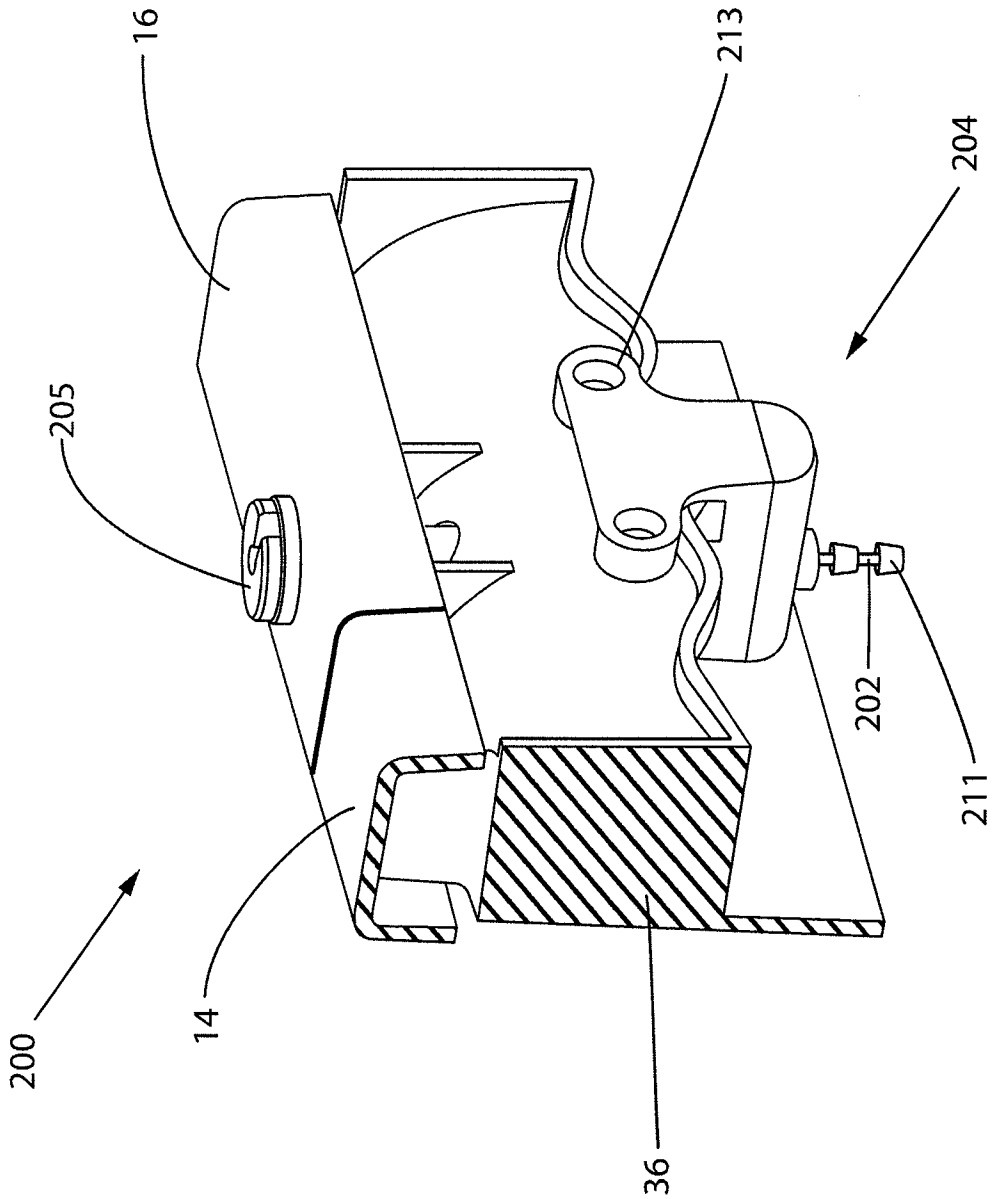

FIG. 13

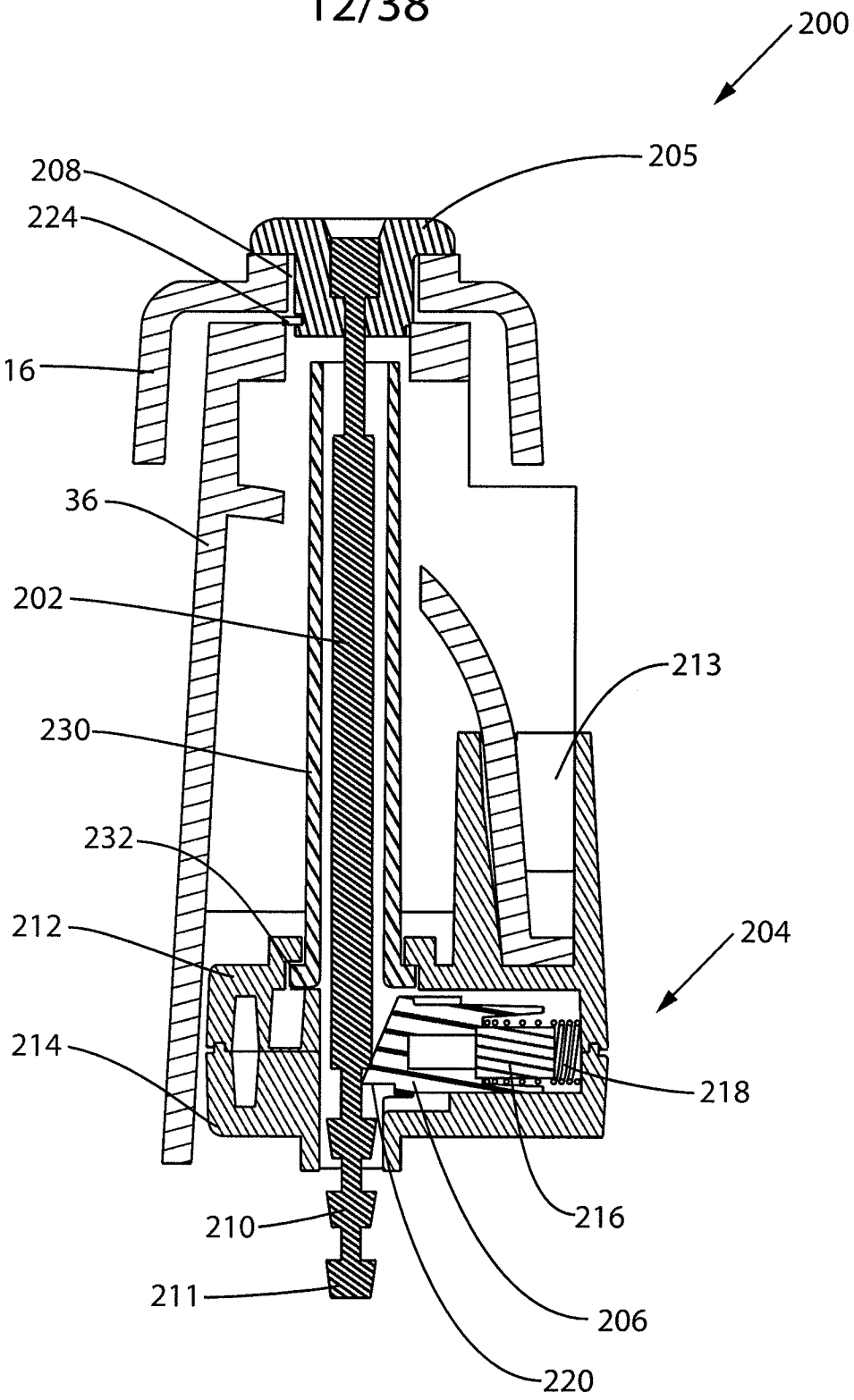
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FIG. 14

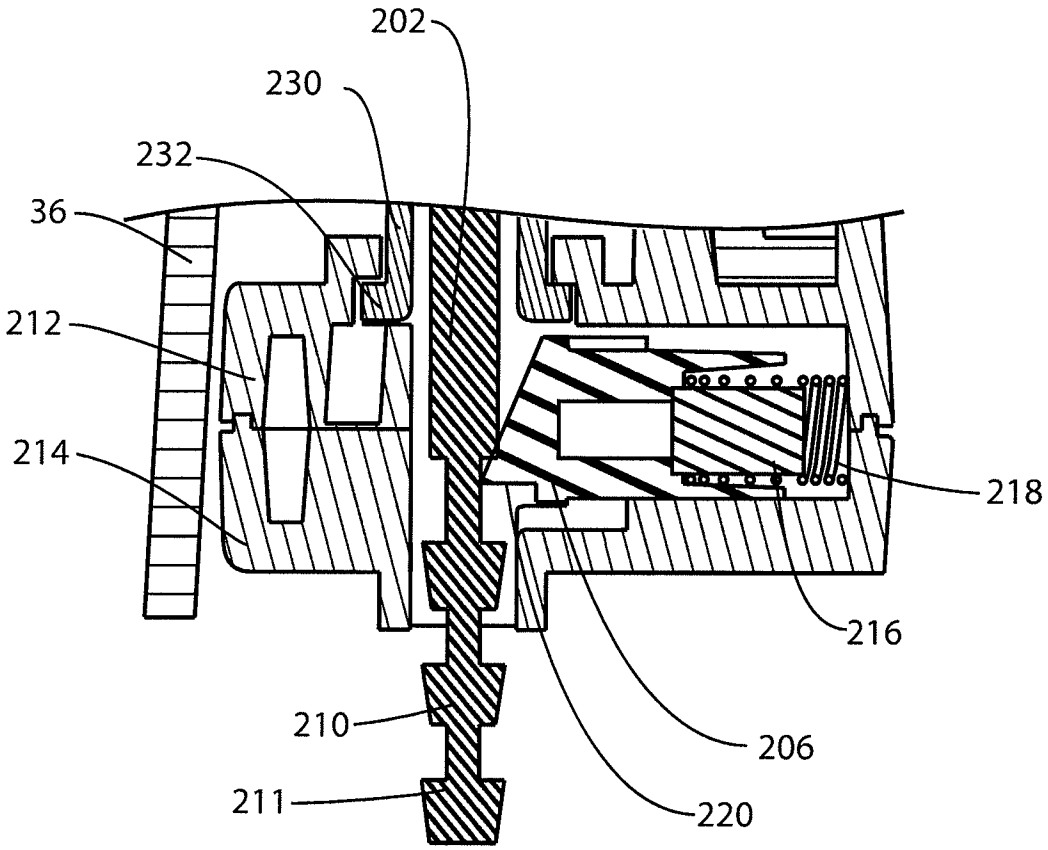

FIG. 15

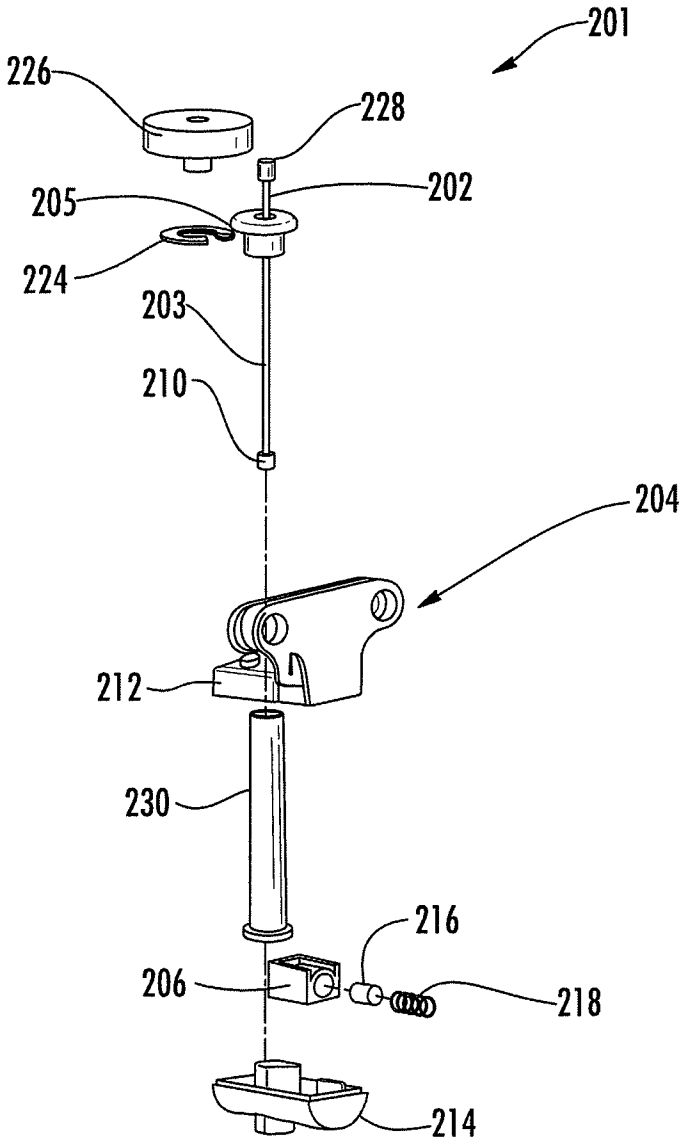

FIG. 16

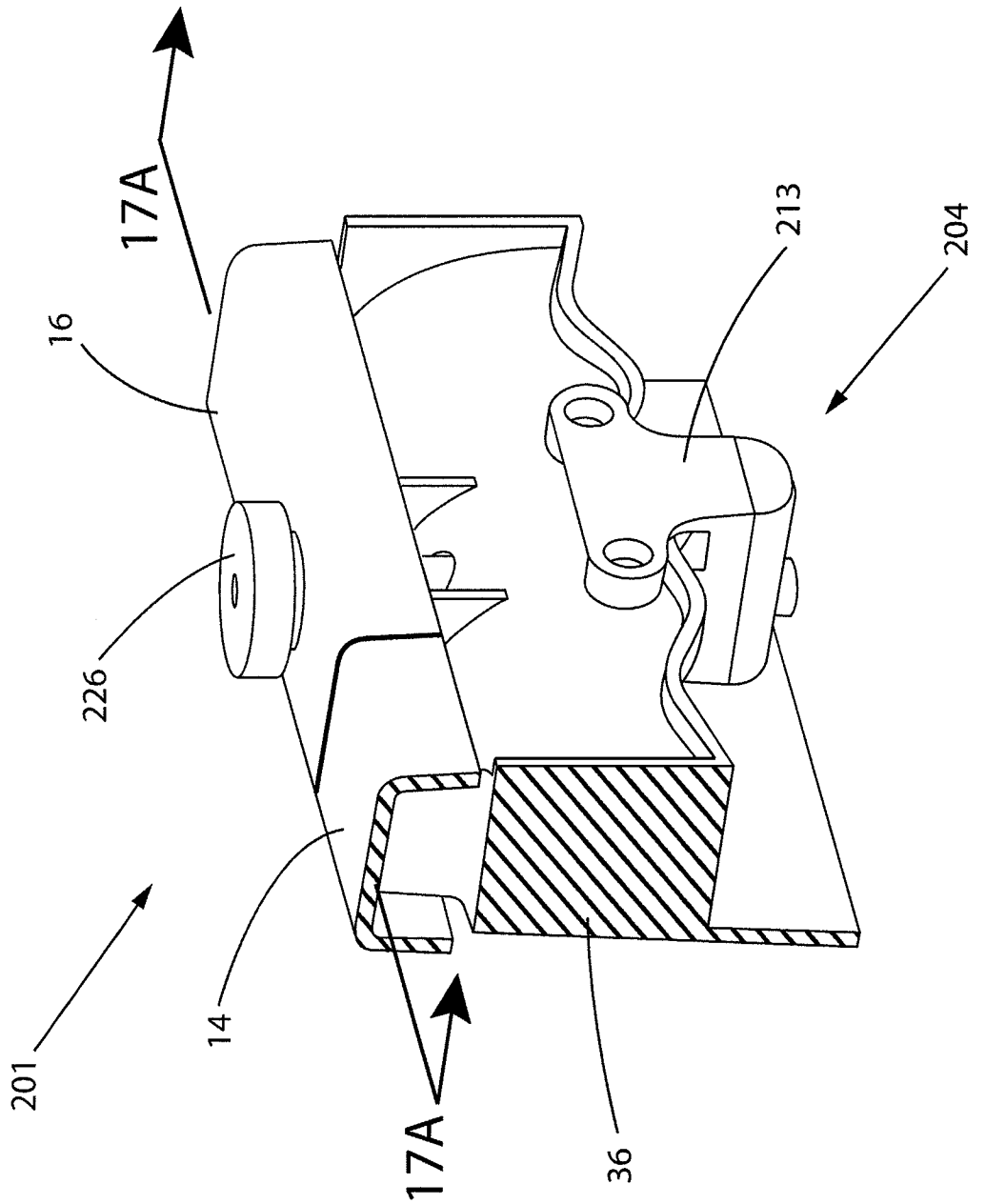

FIG. 17

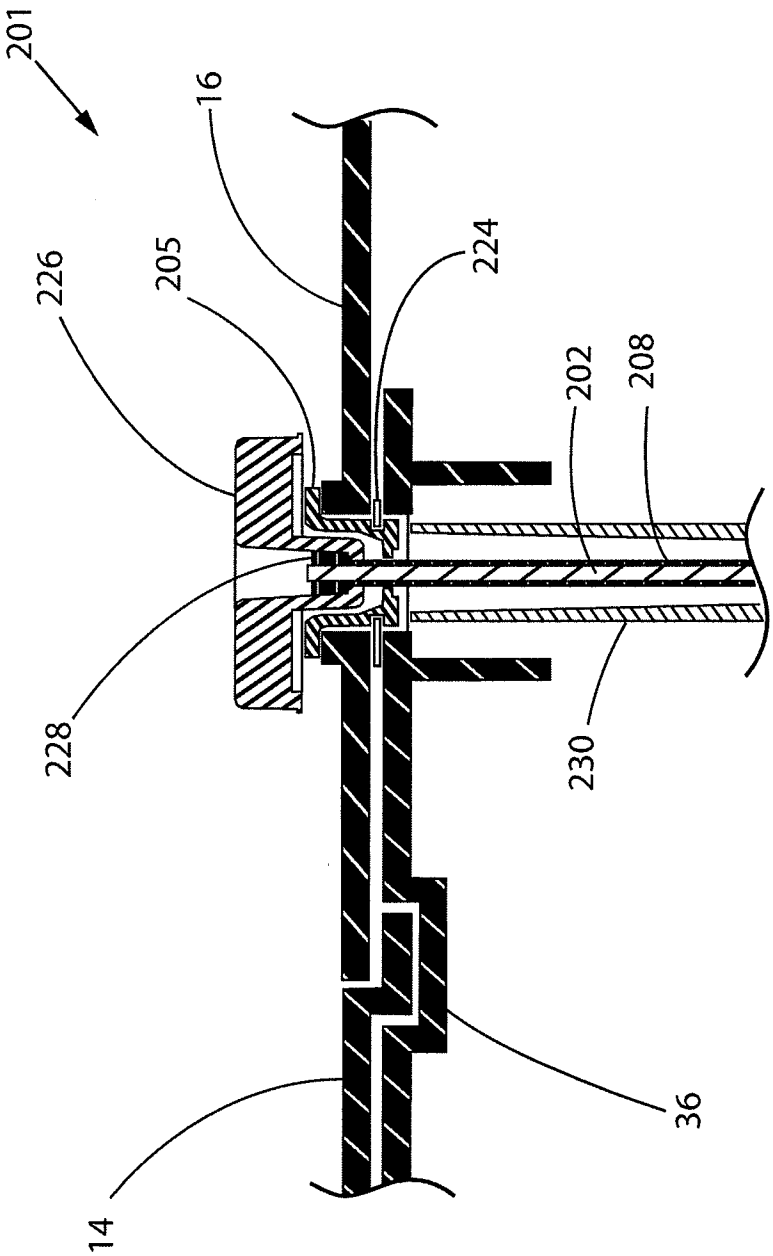

FIG. 17A

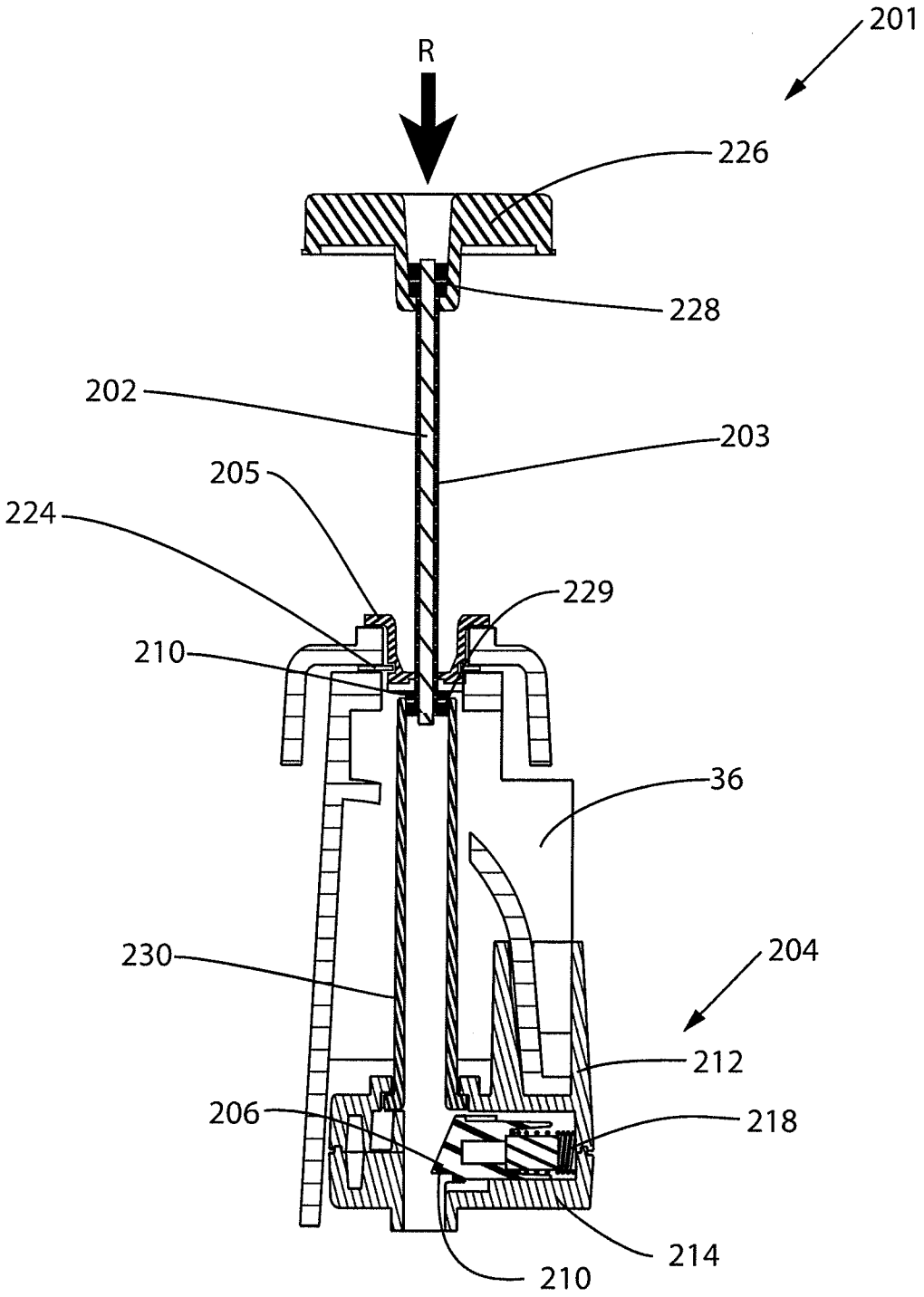
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FIG. 18

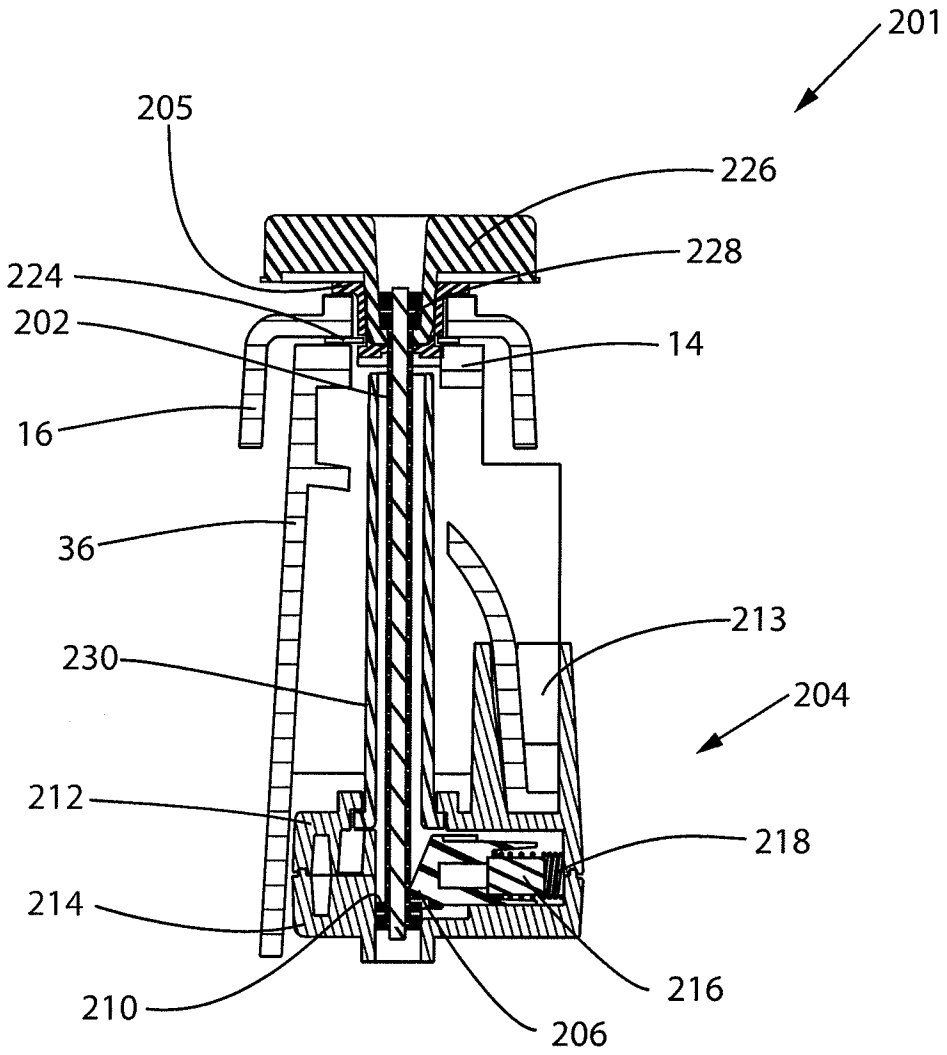
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FIG. 19

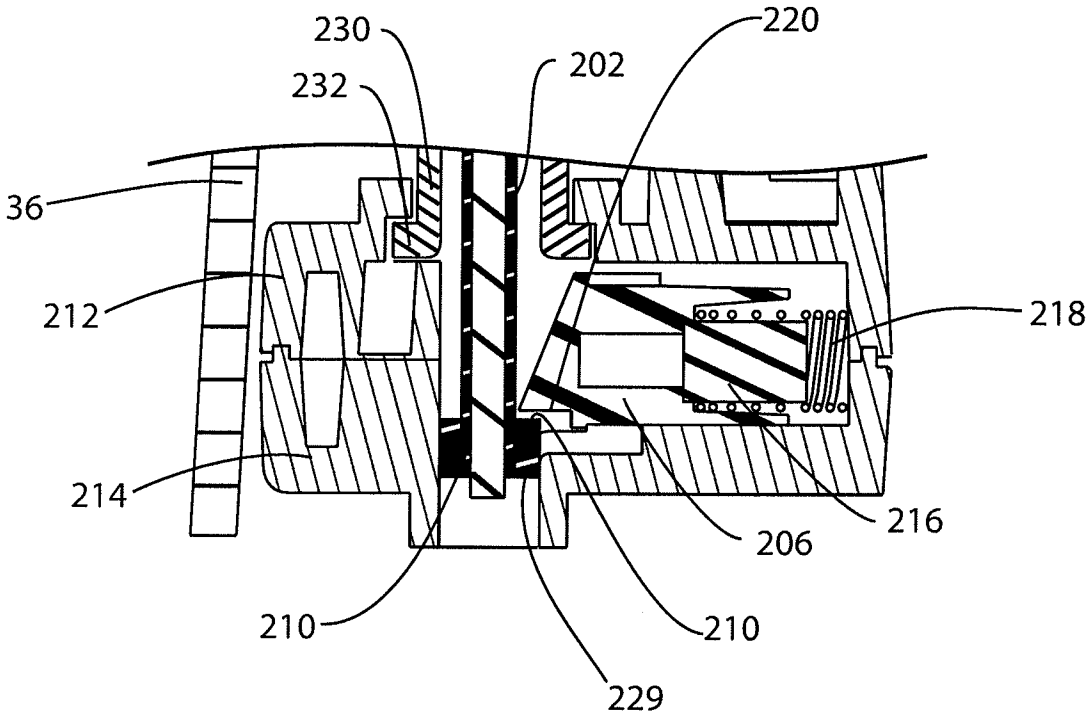


FIG. 20

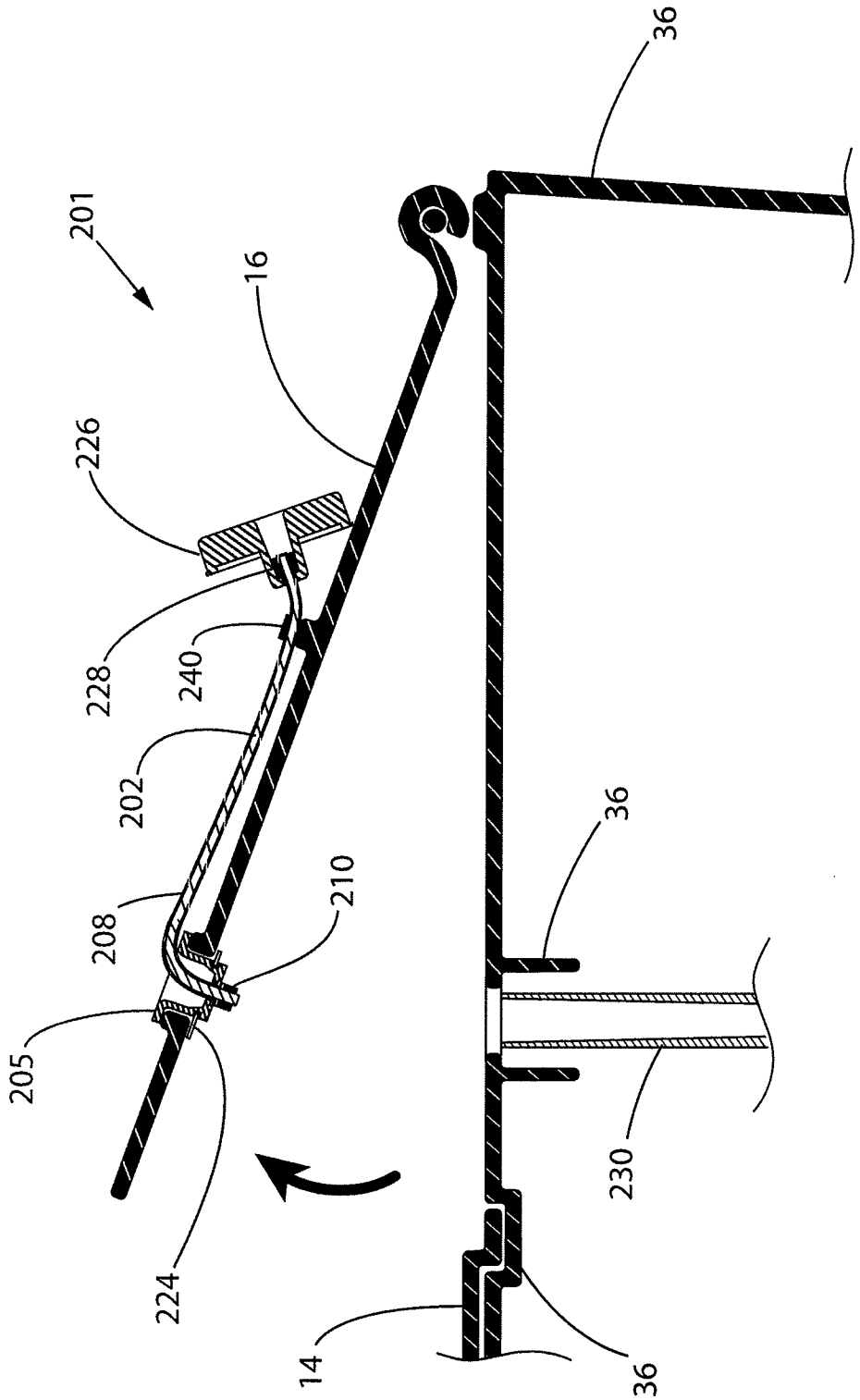


FIG. 21

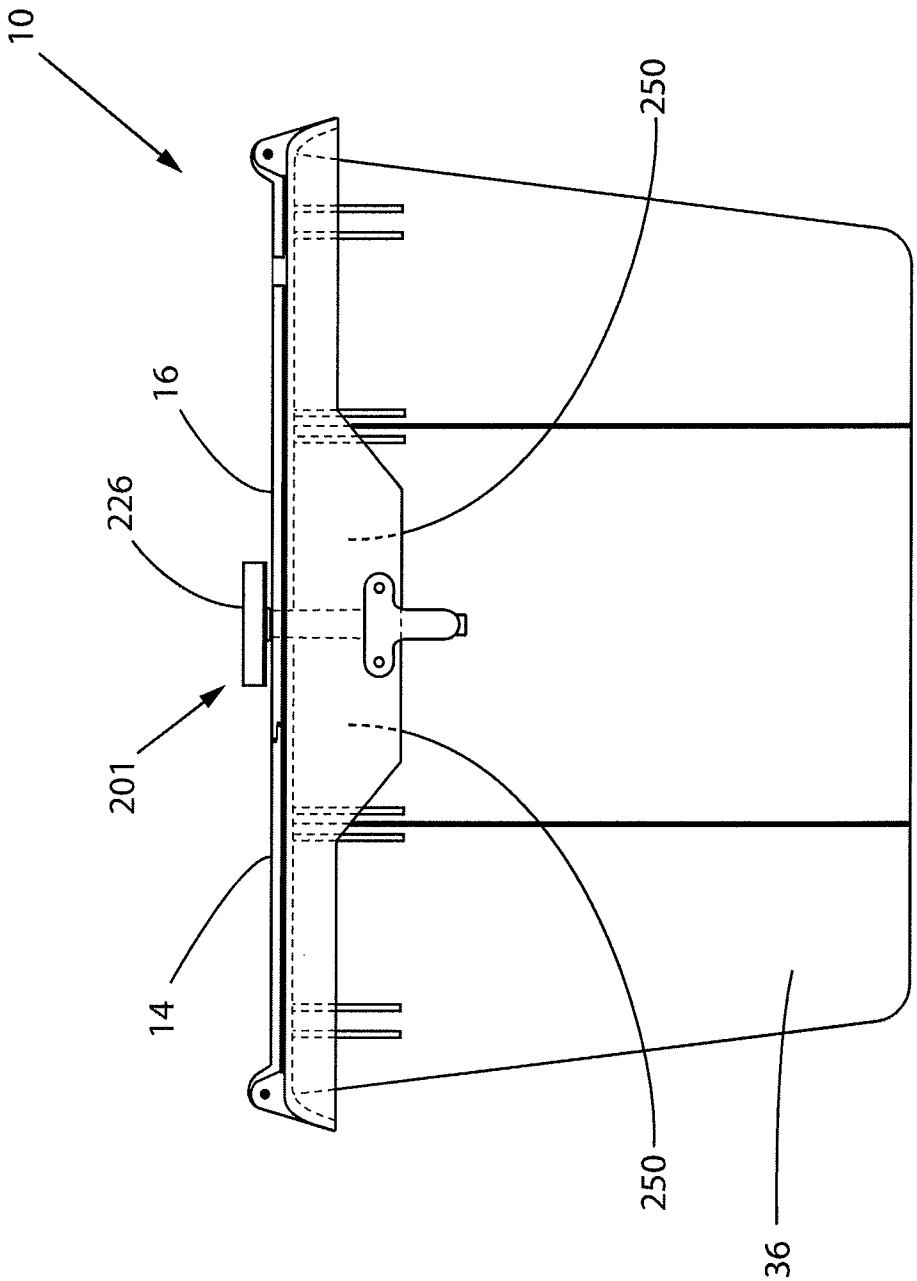


FIG. 22

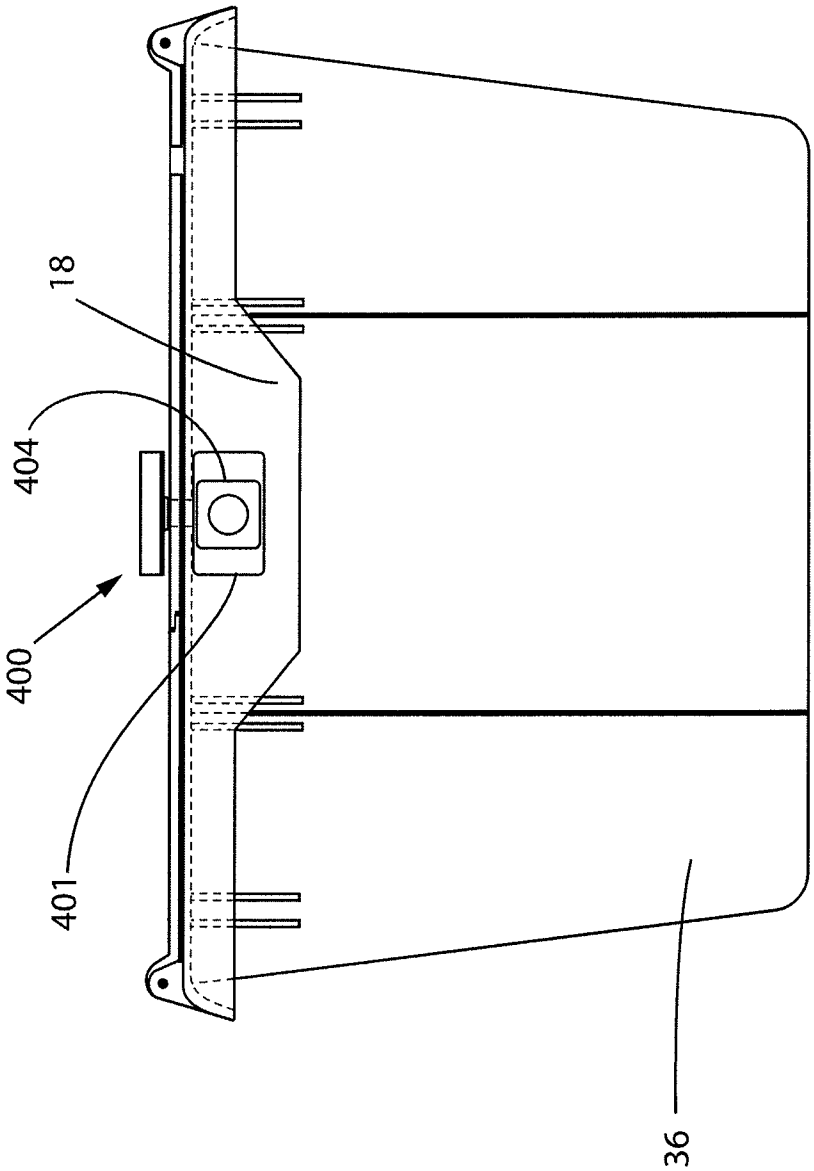


FIG. 23

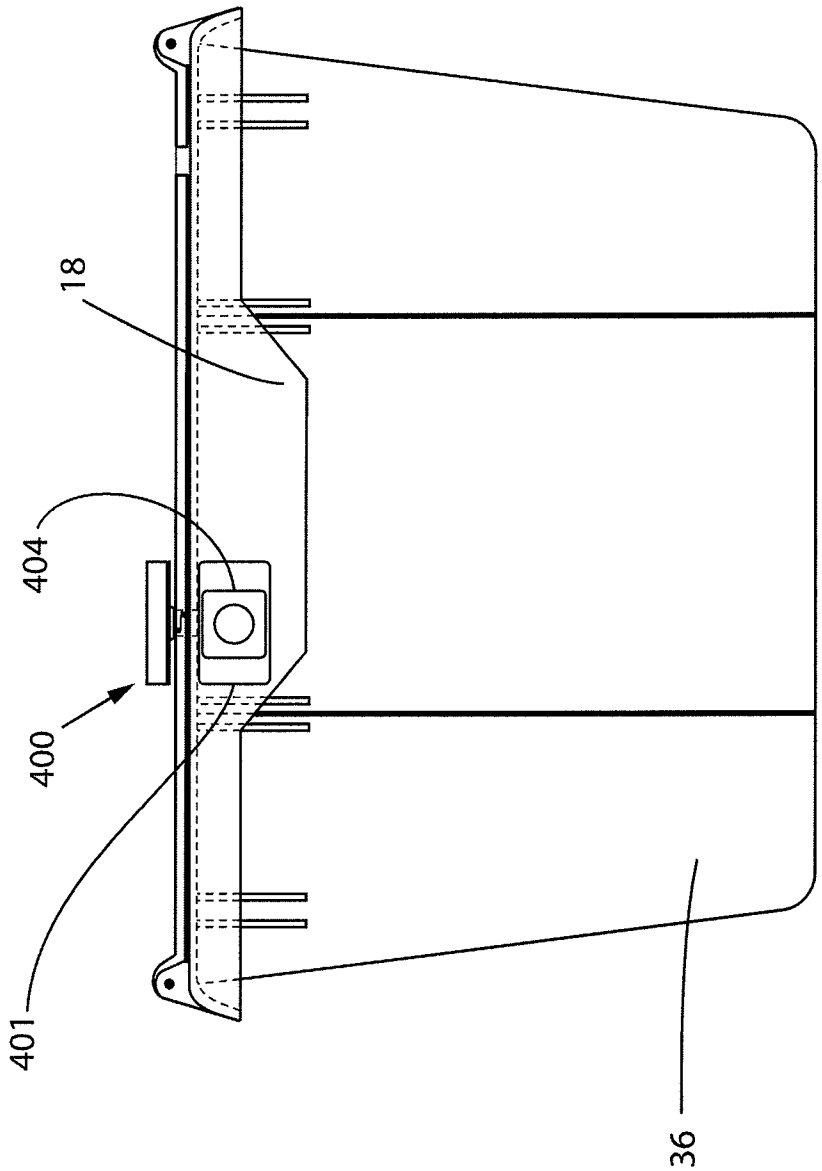


FIG. 24

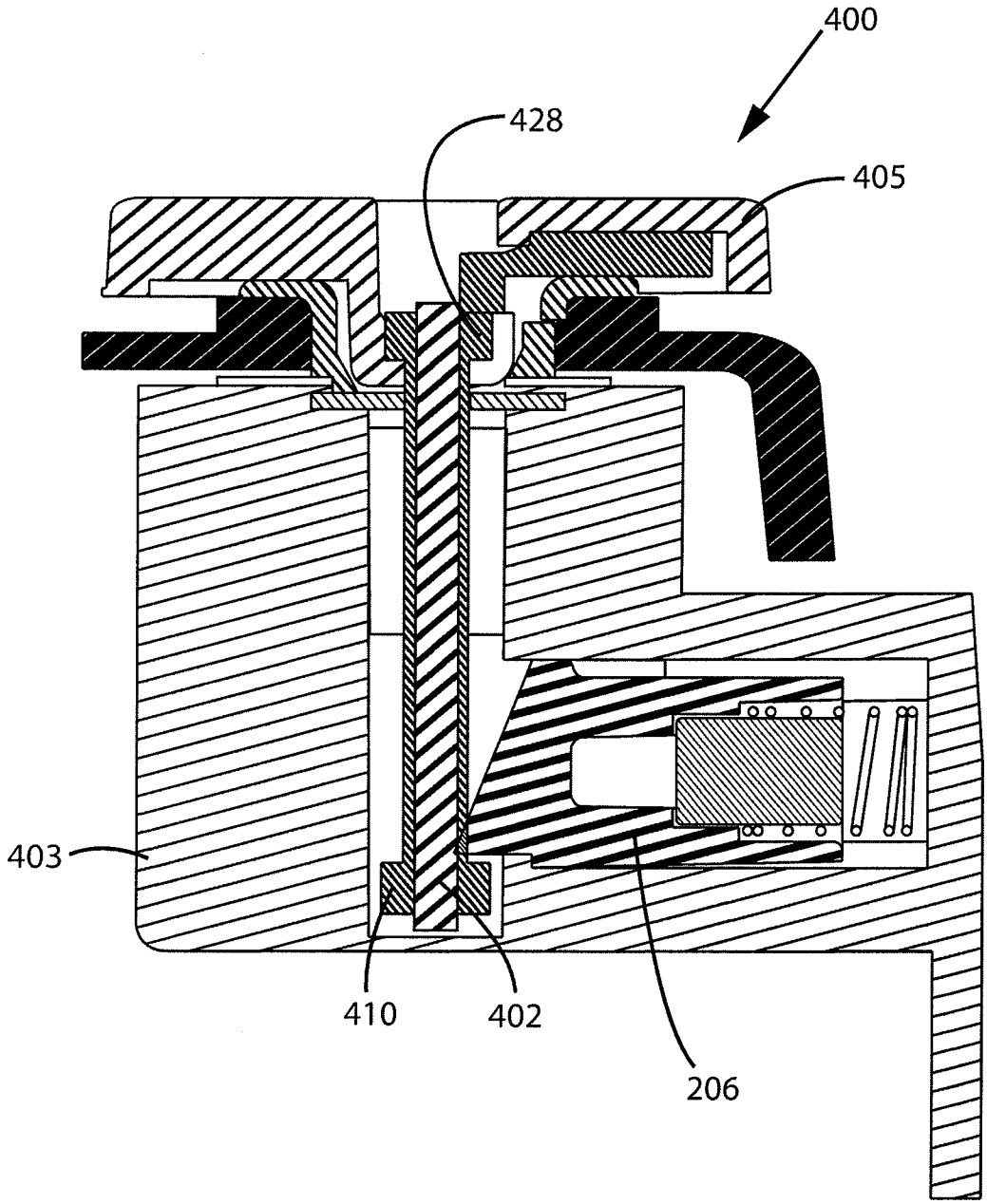


FIG. 25

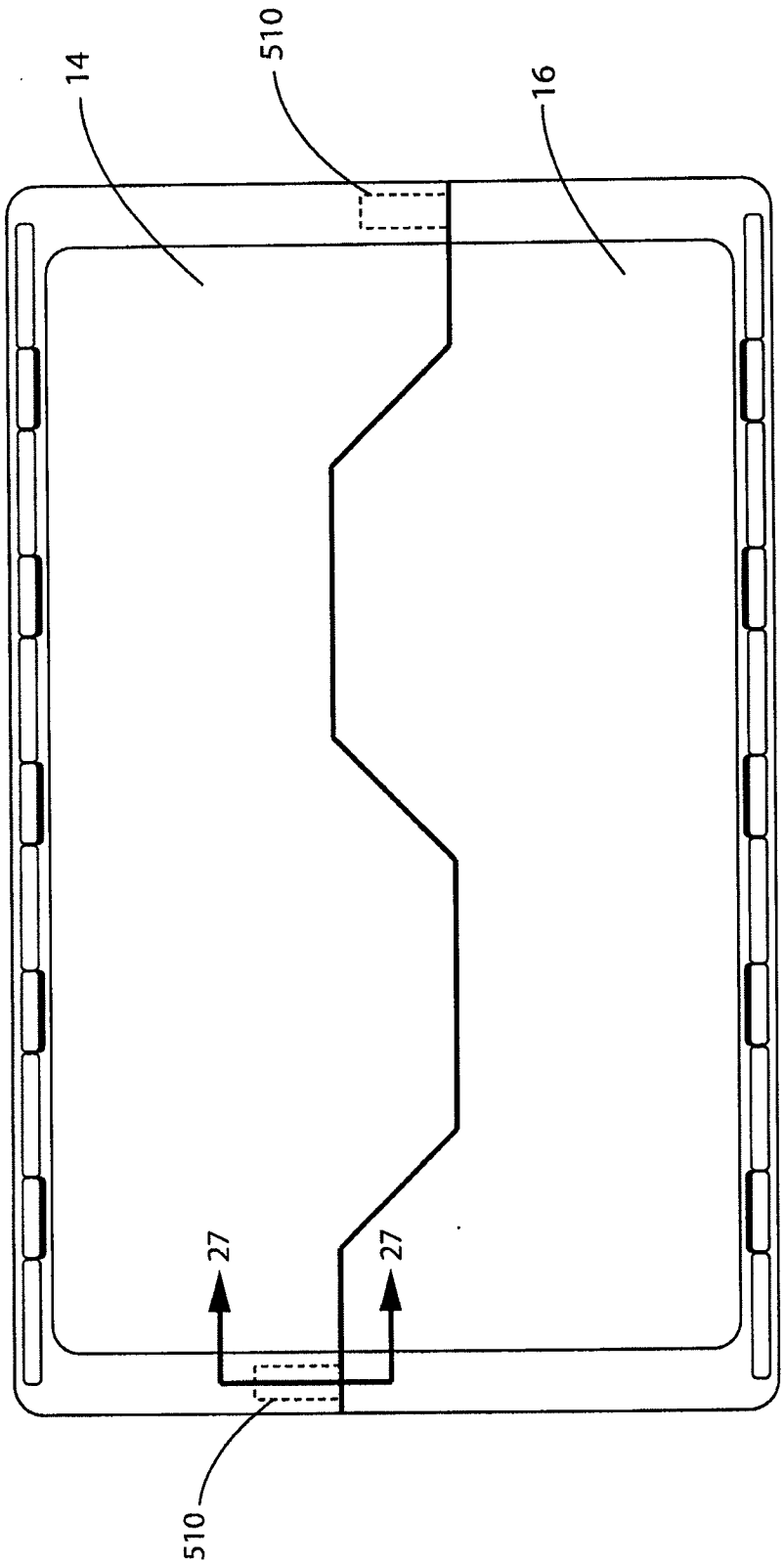


FIG. 26

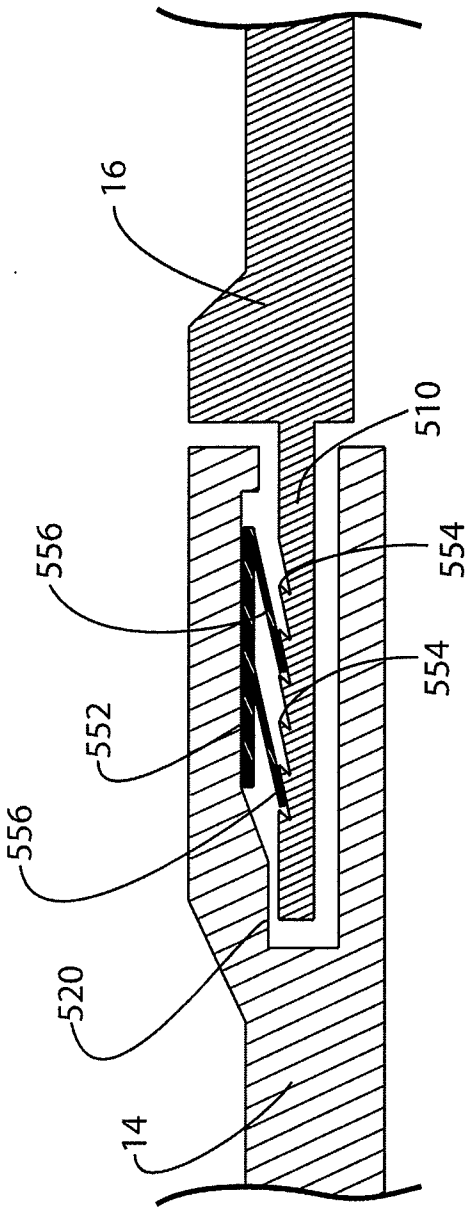


FIG. 27

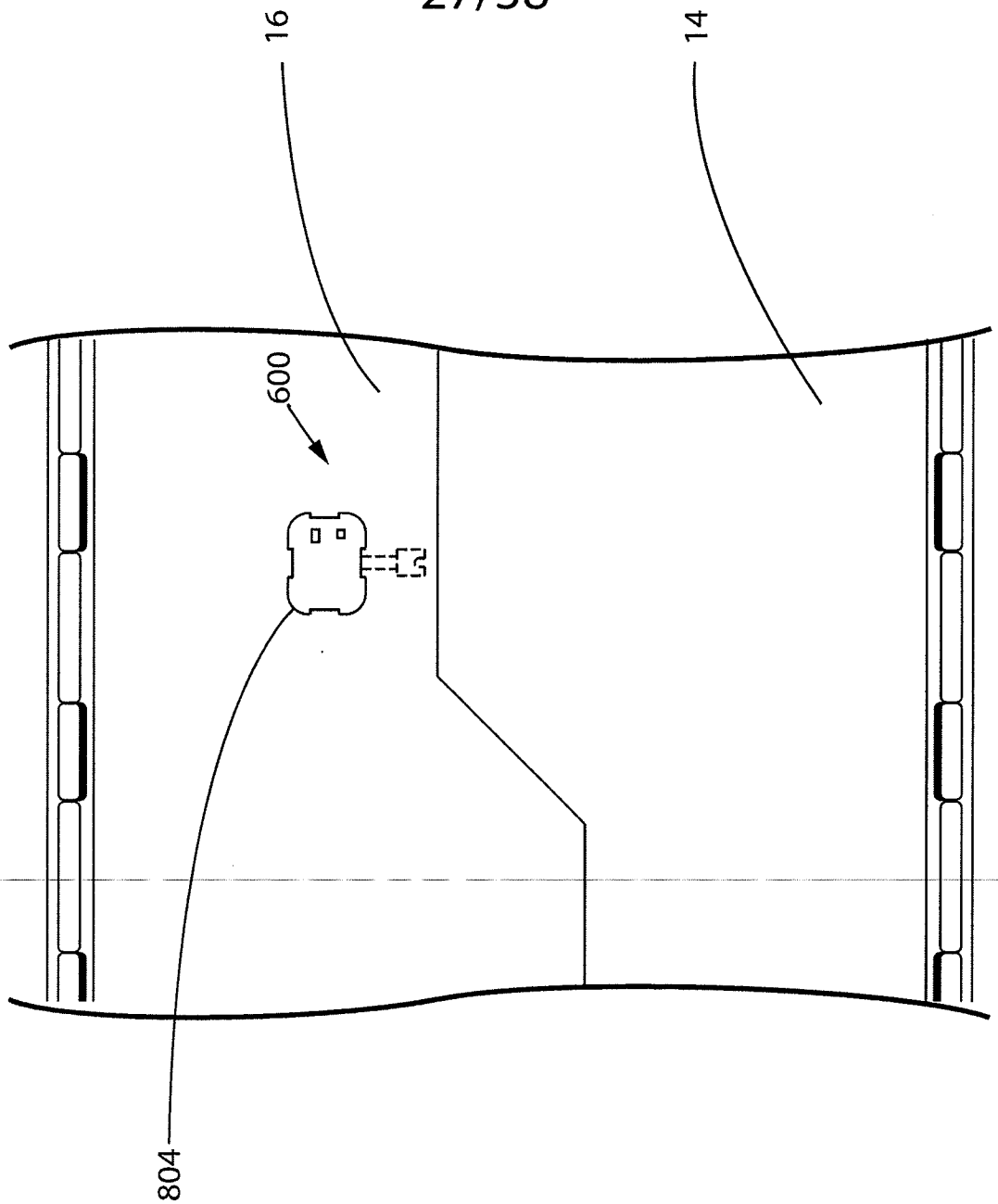


FIG. 28

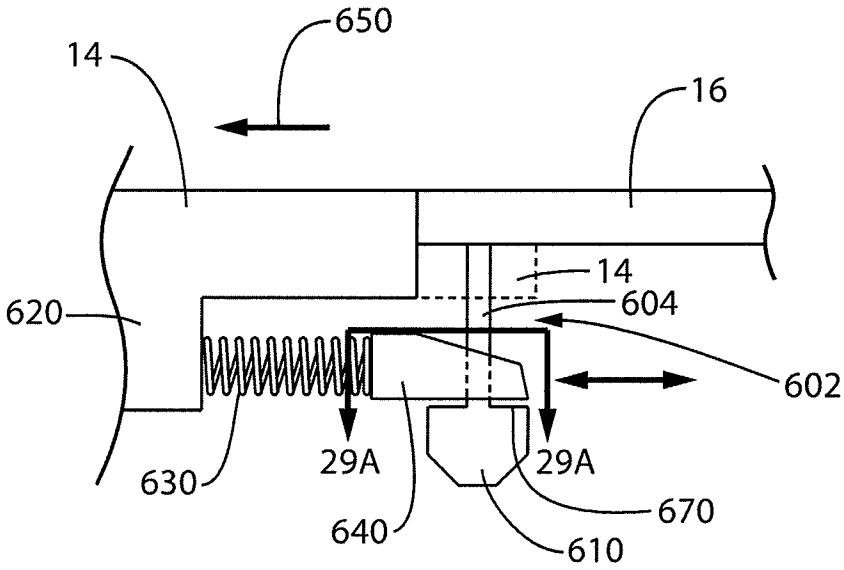


FIG. 29

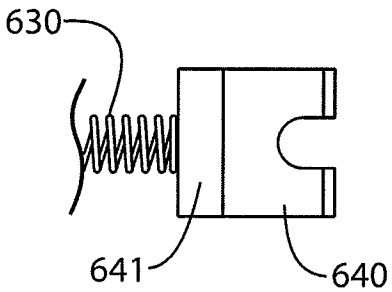


FIG. 29A

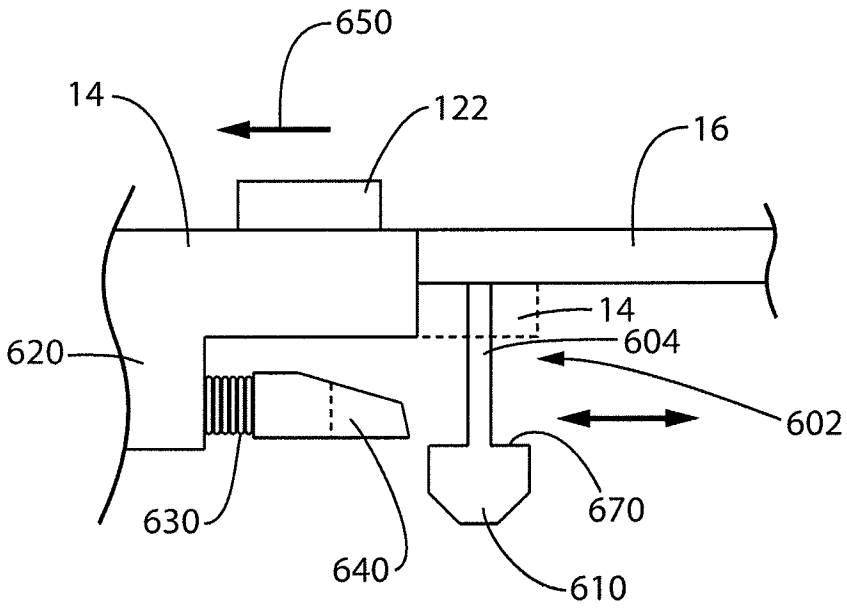


FIG. 30

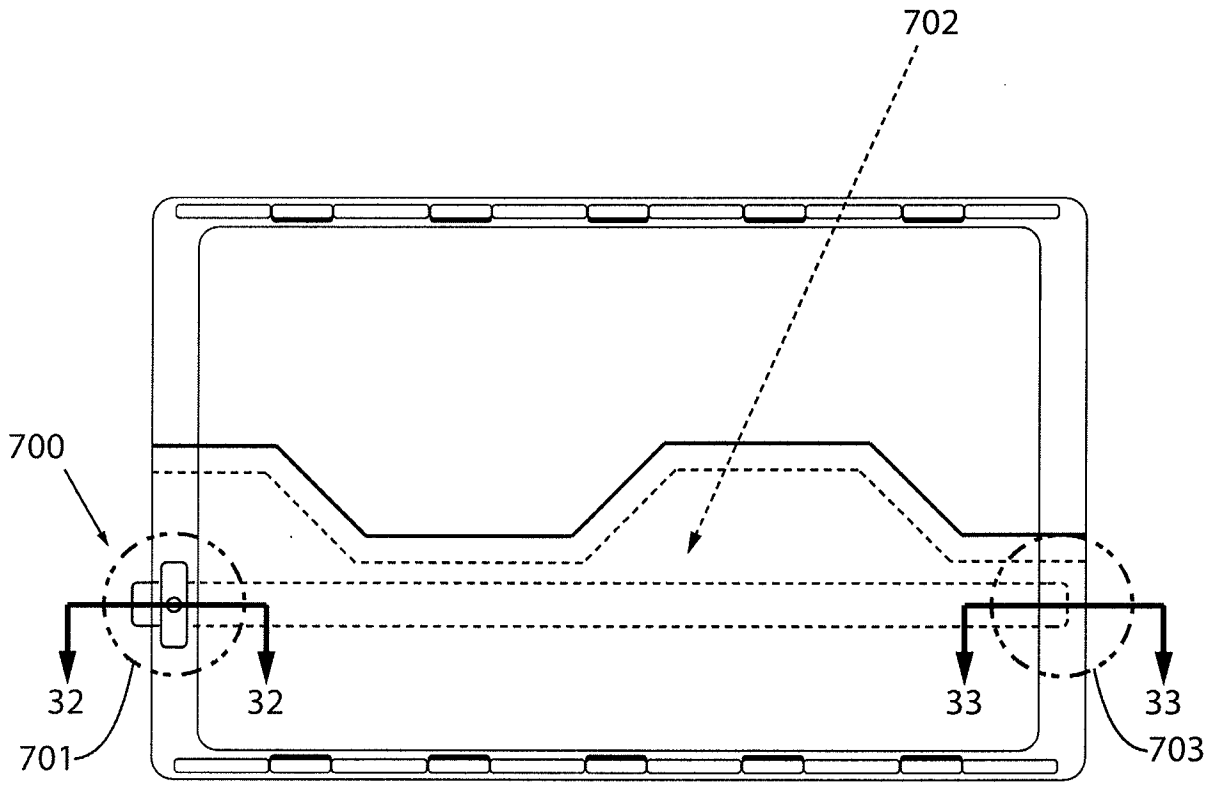


FIG. 31

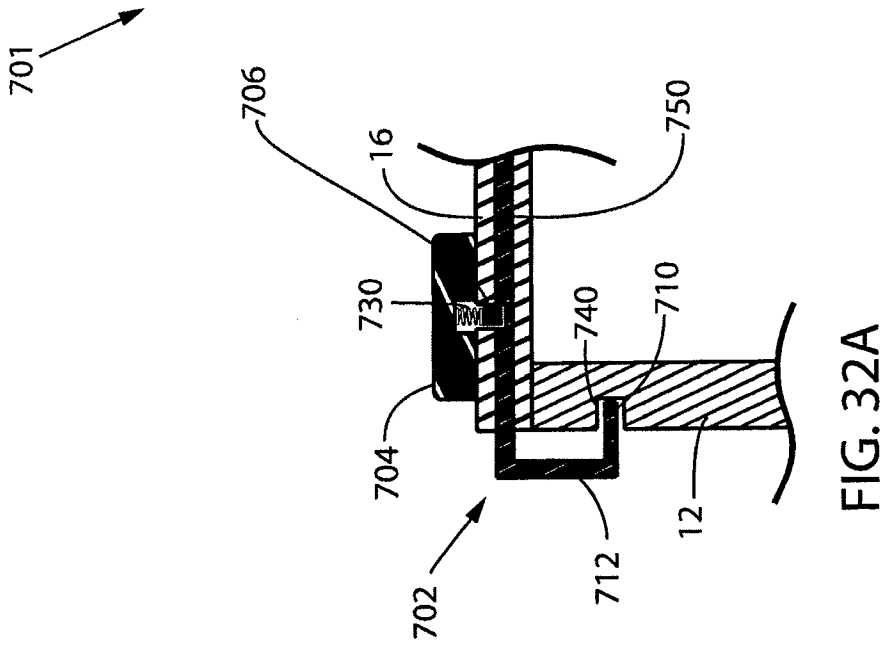


FIG. 32A

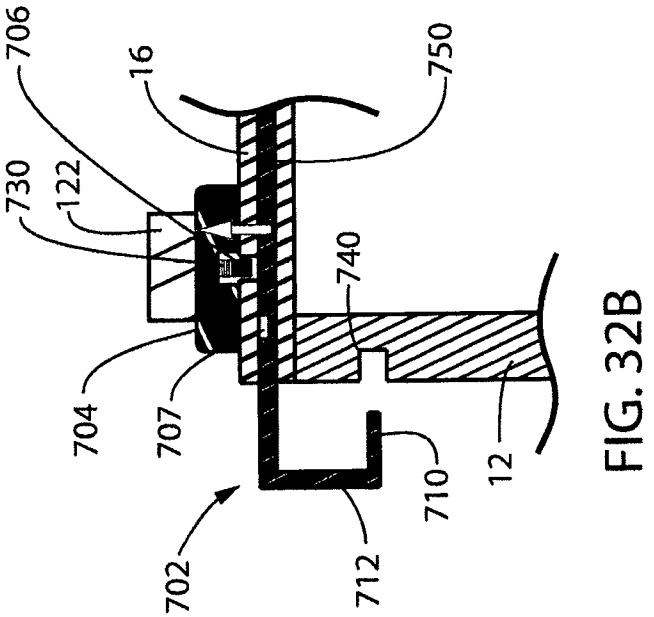


FIG. 32B

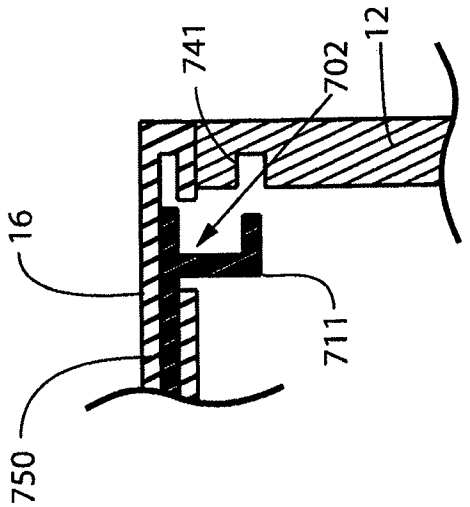


FIG. 33B

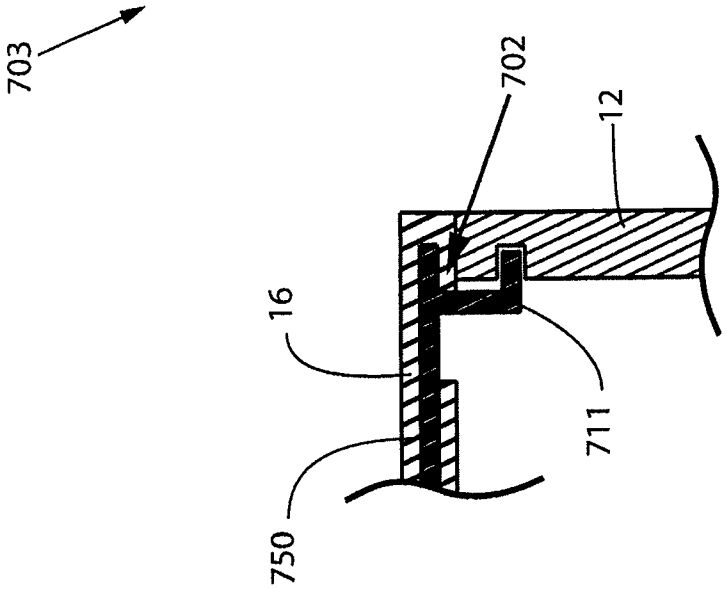


FIG. 33A

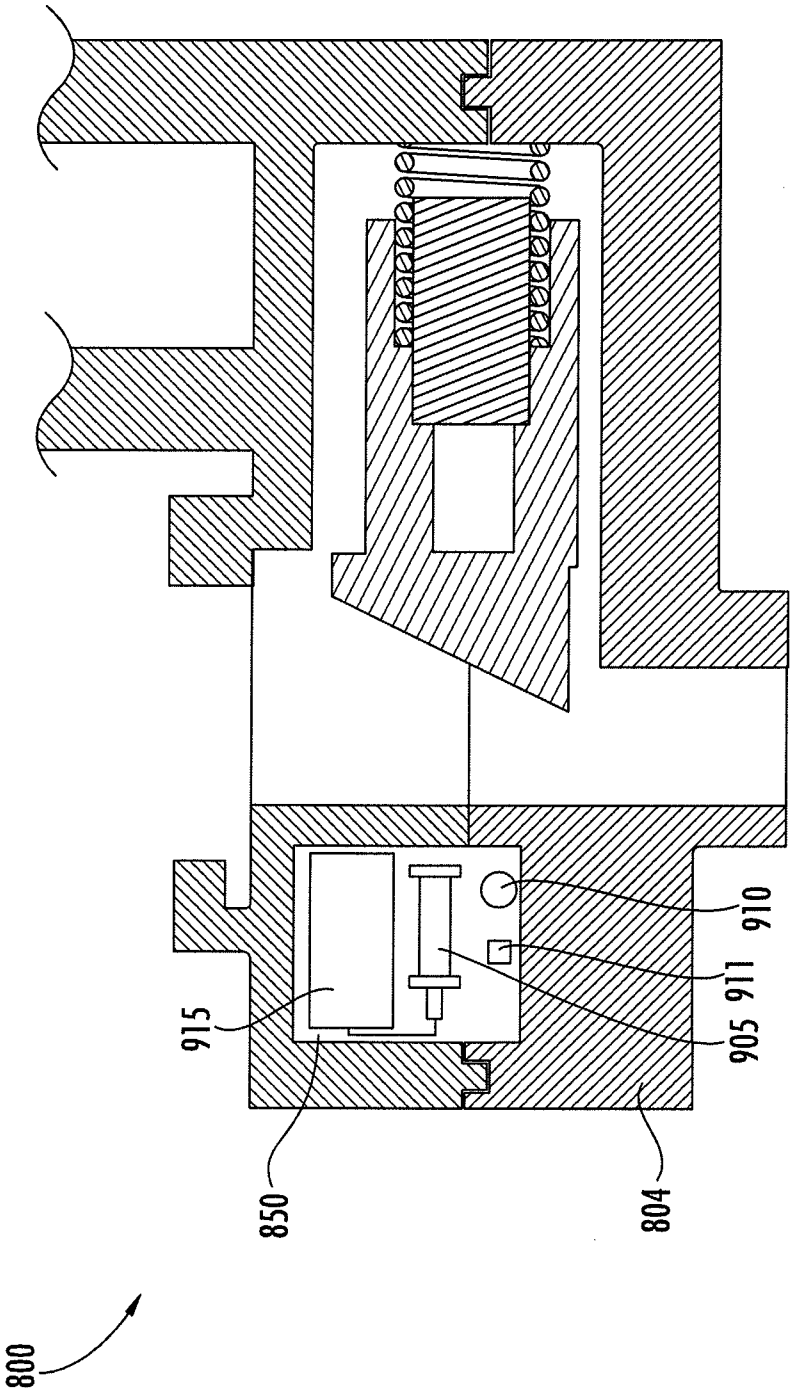
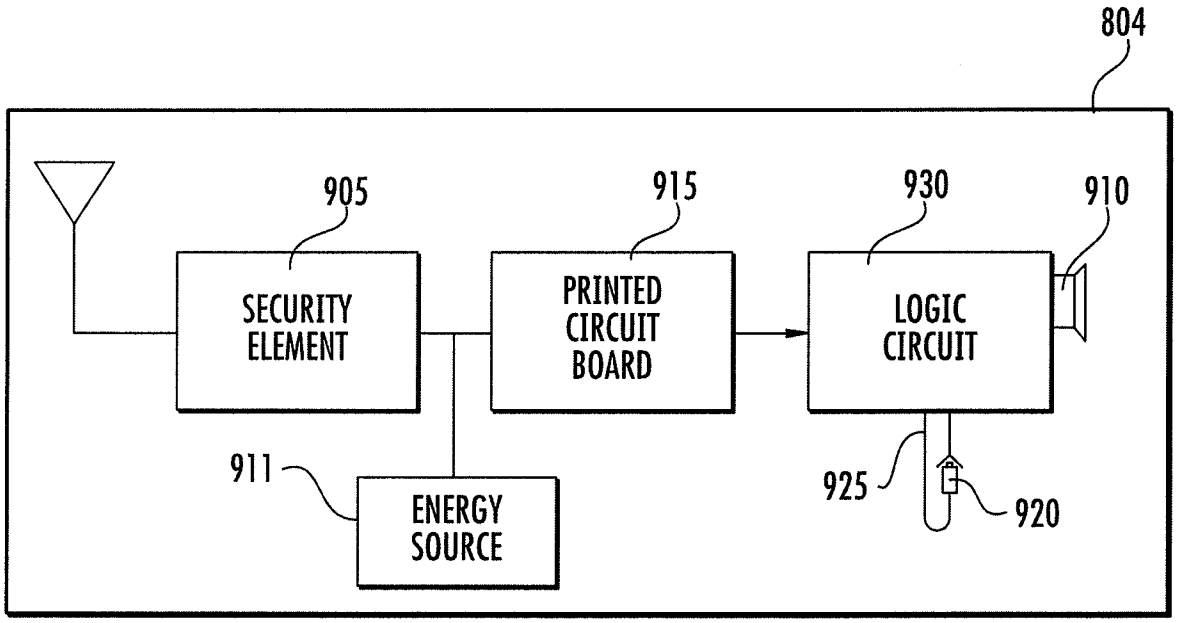


FIG. 34


804
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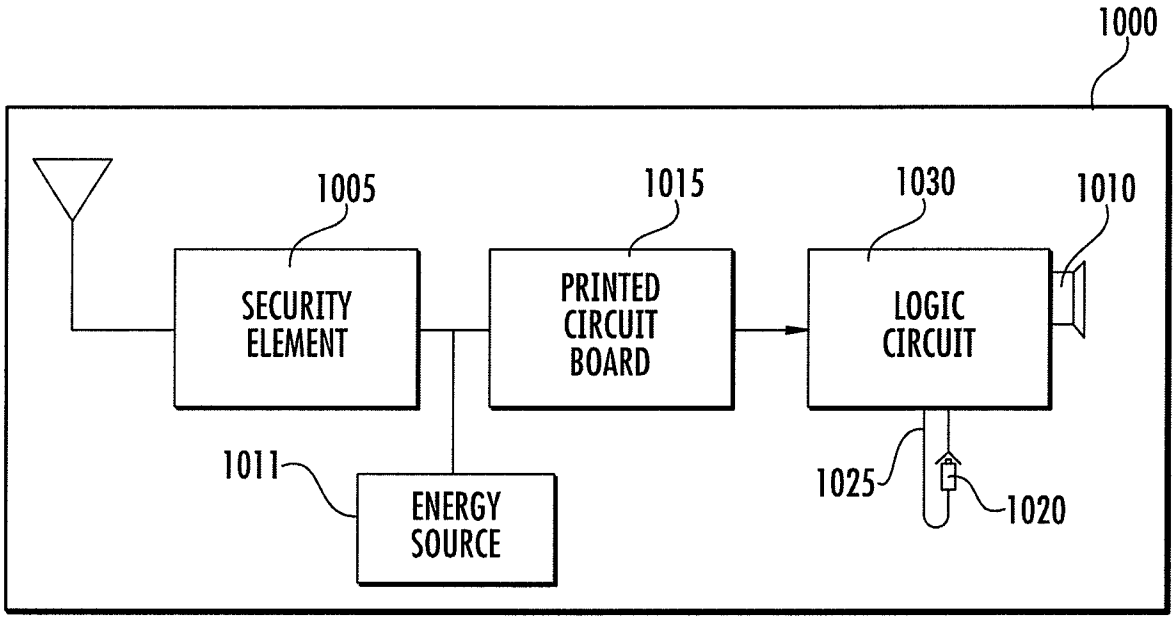
915
930
910
SECURITY ELEMENT
PRINTED CIRCUIT BOARD
LOGIC CIRCUIT
911
ENERGY SOURCE
925
920

FIG. 35


1000
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1015
1030
1010
SECURITY ELEMENT
PRINTED CIRCUIT BOARD
LOGIC CIRCUIT
1011
ENERGY SOURCE
1025
1020

FIG. 36

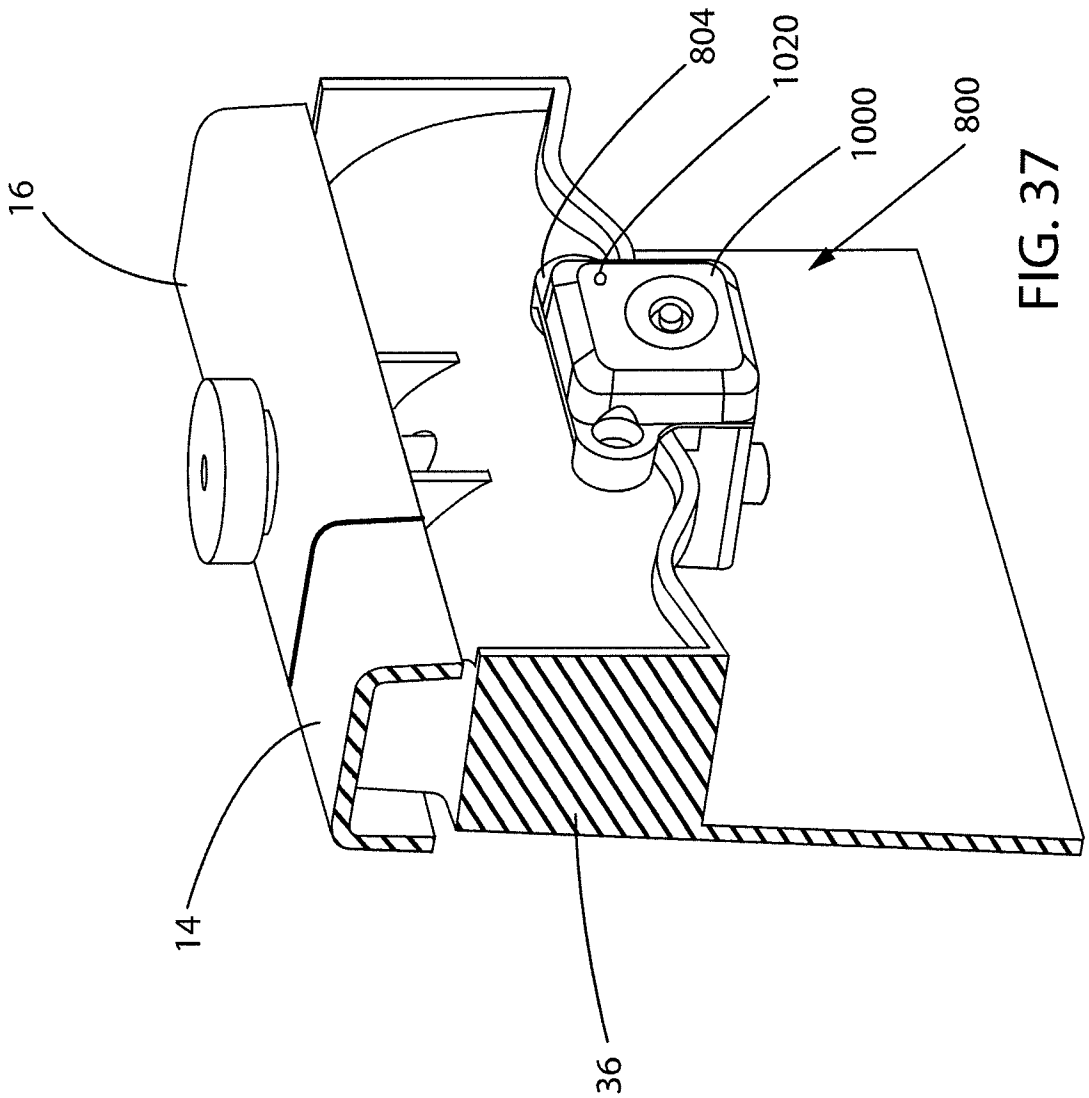

FIG. 37

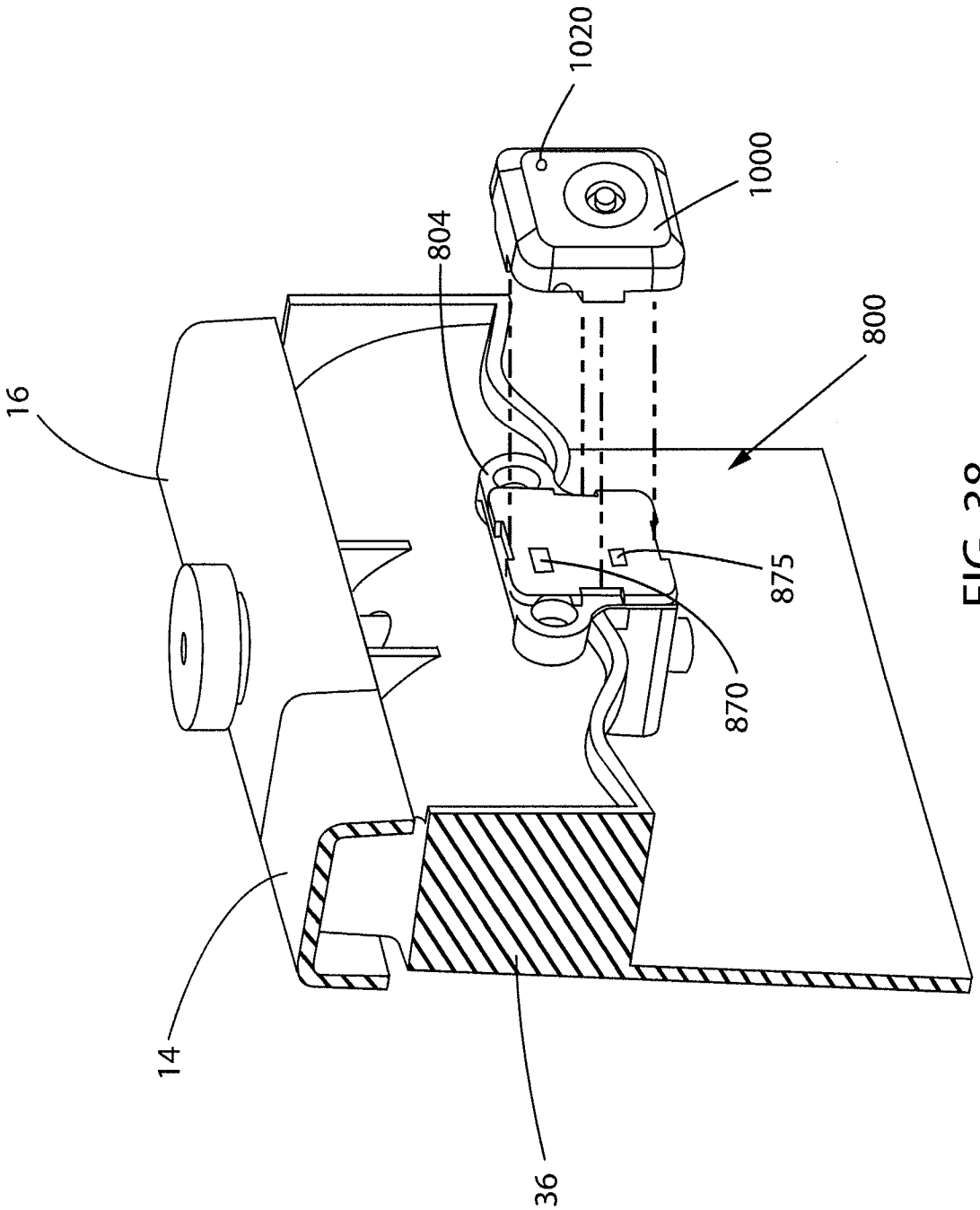

FIG. 38

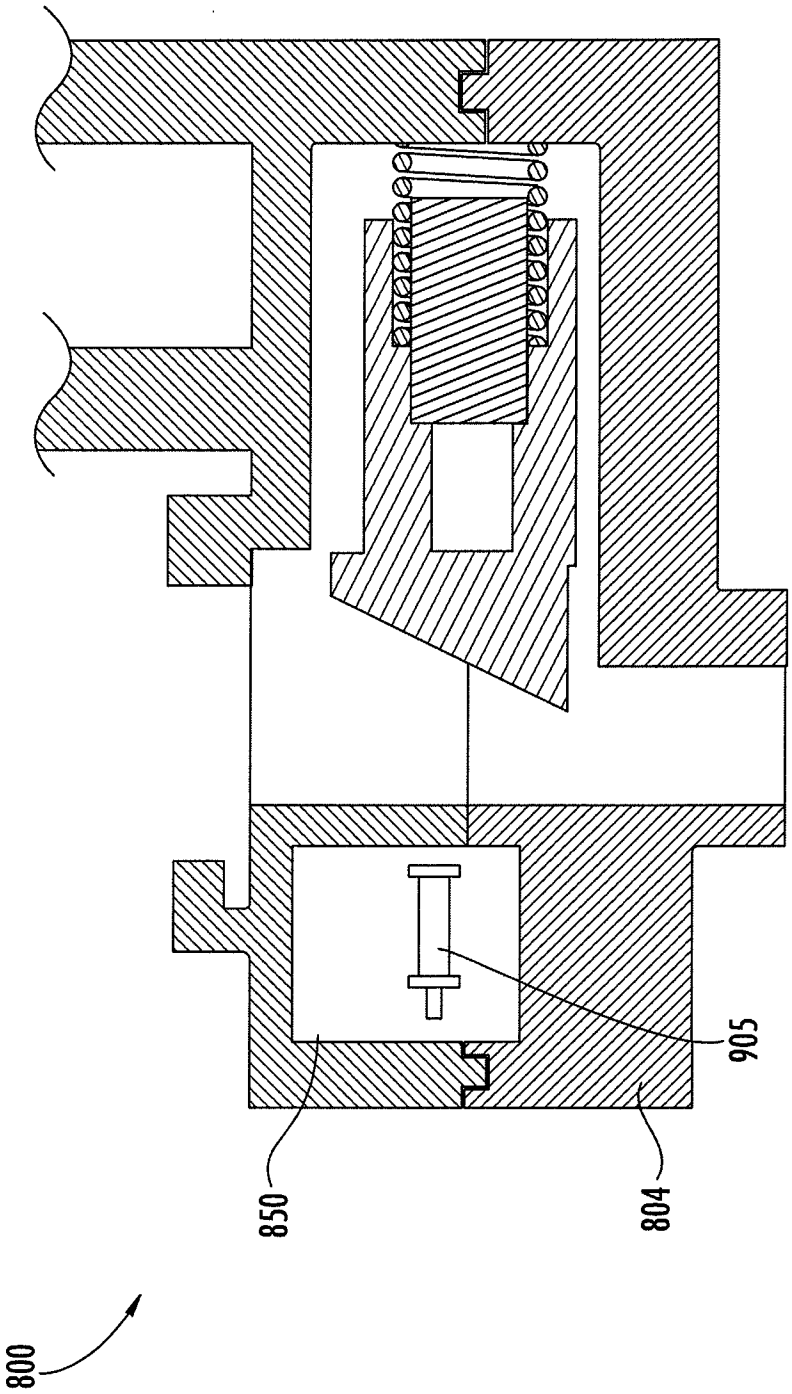

FIG. 39