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Andino

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(54) **ANCHORING SYSTEM**

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CPC ***A61M 25/02*** (2013.01); ***A61B 50/20*** (2016.02); ***A61M 5/1418*** (2013.01); ***A61M 16/0003*** (2014.02); *A61M 2025/024* (2013.01); *A61M 2209/082* (2013.01); *A61M 2209/088* (2013.01)

(58) **Field of Classification Search**

CPC A61M 2209/082; A61M 5/1418; A61M 2025/024; A61M 25/02; A61M 39/28; A61M 39/287; A61B 50/20

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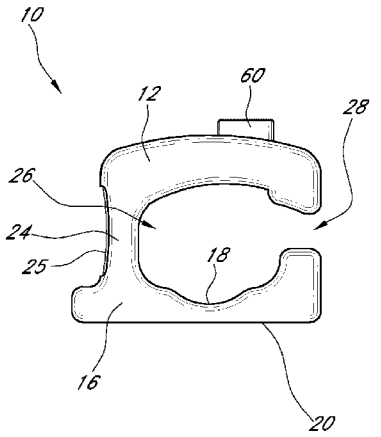
(57) **ABSTRACT**

A retainer comprises a first member and a second member. The first member can define at least a portion of a channel. The channel can have a longitudinal axis and be configured to receive at least a portion of a medical article. The second member can be moveable with respect to the first member, between locked and unlocked positions. The second member can contact the portion of the medical article received by the channel at least when in the locked position so as to inhibit longitudinal movement of the medical article relative to the retainer.

11 Claims, 7 Drawing Sheets



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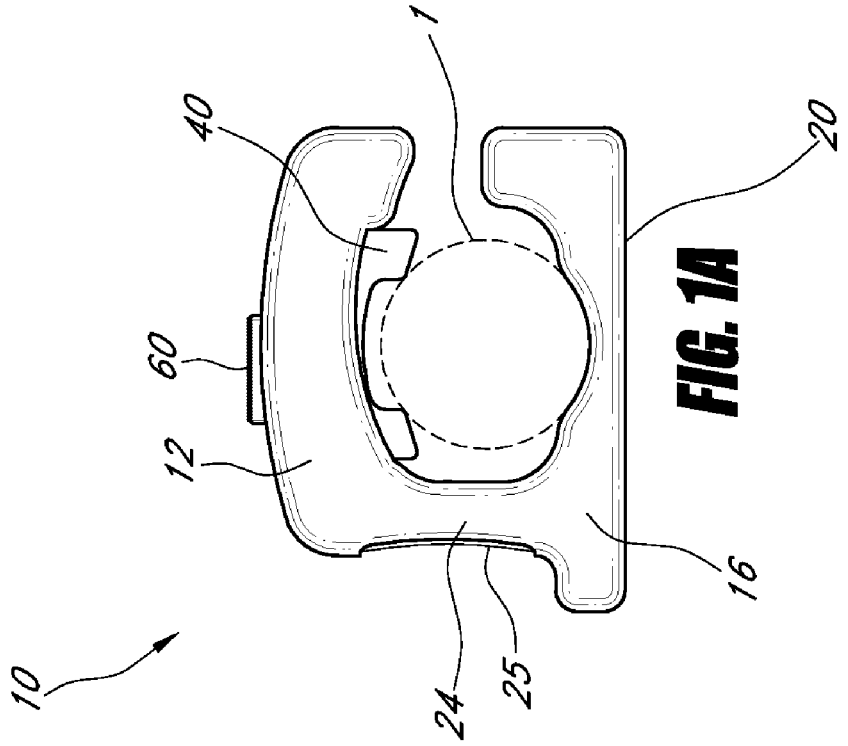


FIG. 1A

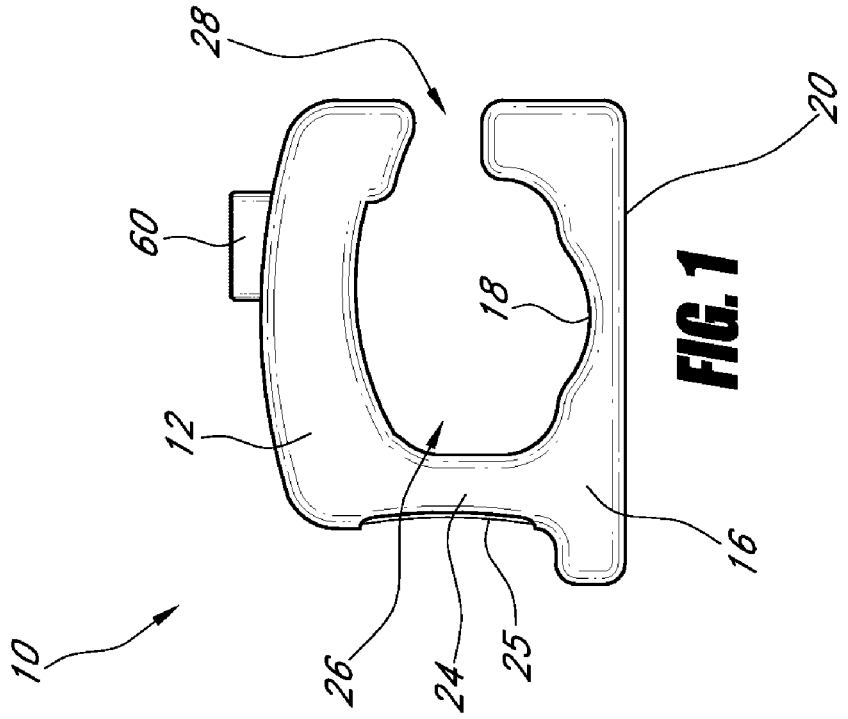


FIG. 1

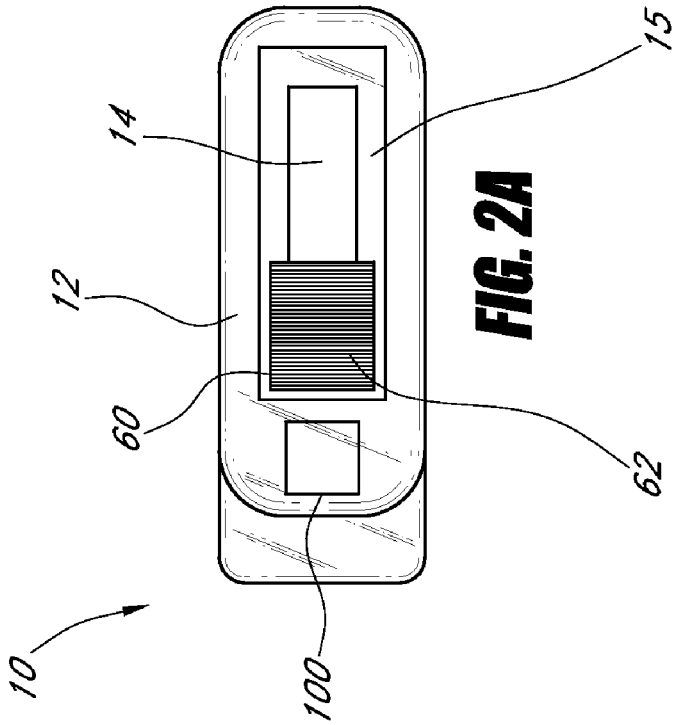


FIG. 2A

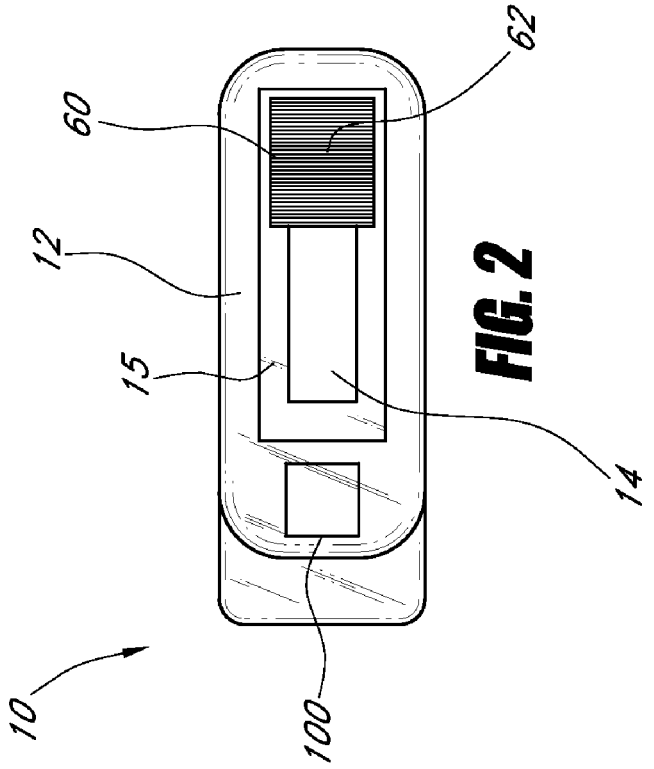


FIG. 2

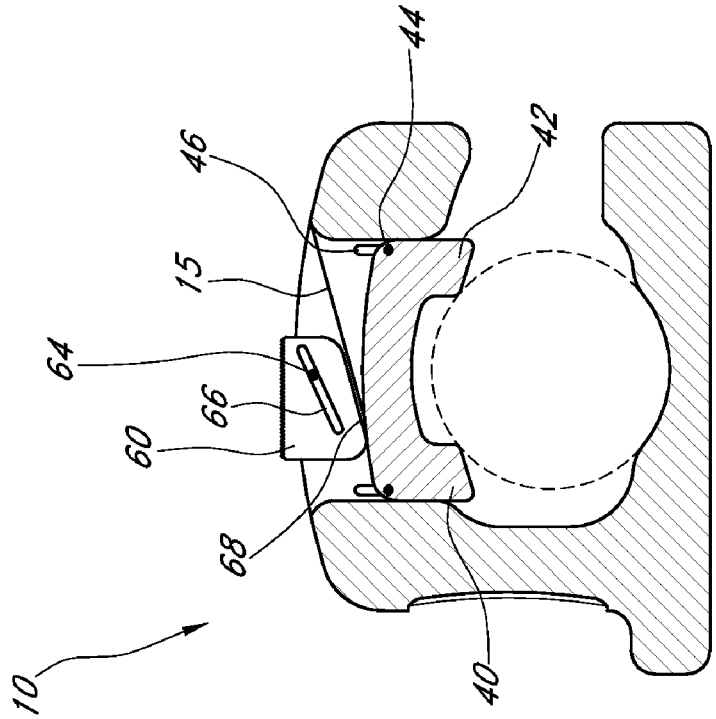


FIG. 3A

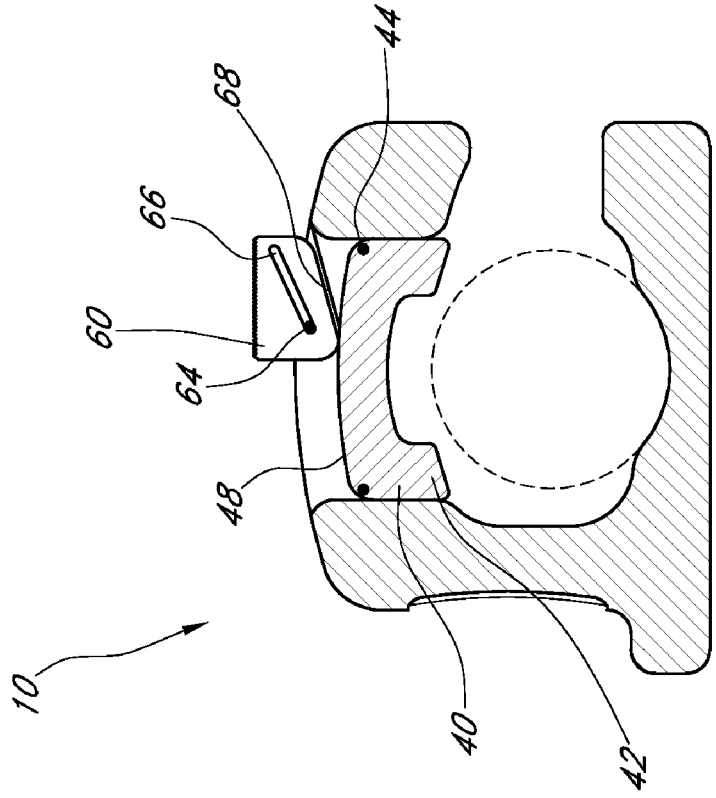


FIG. 3

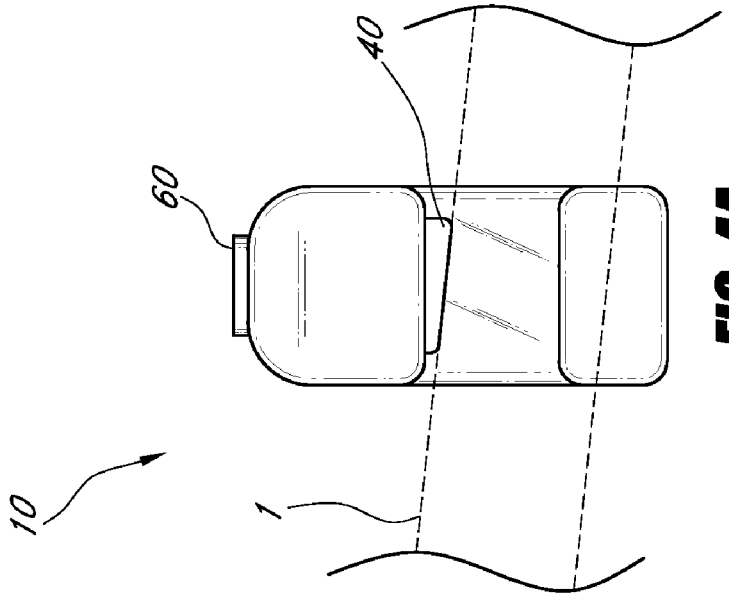


FIG. 4A

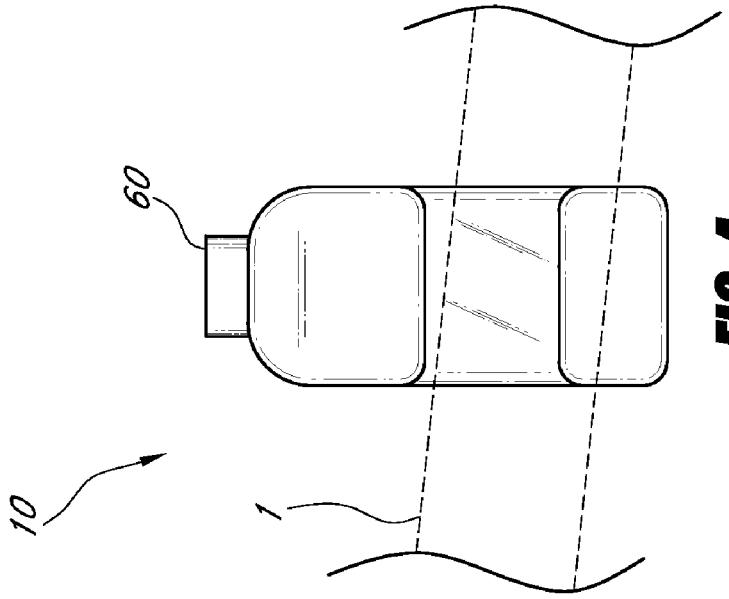


FIG. 4

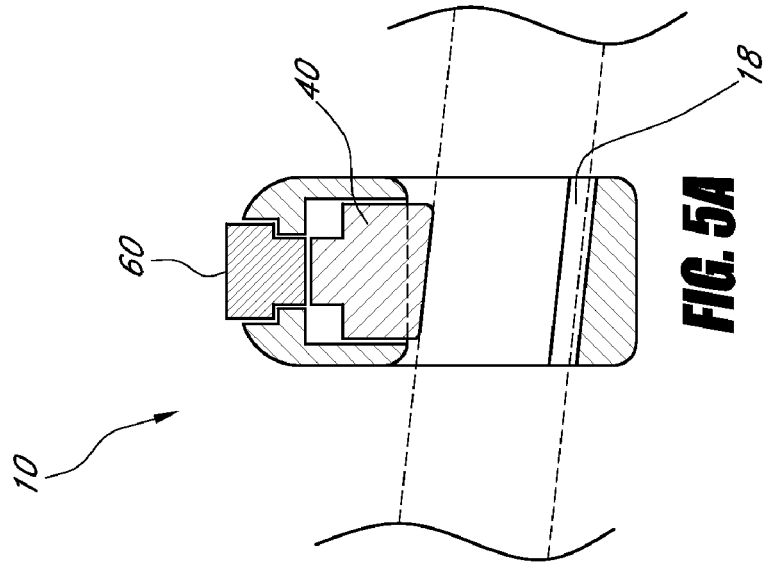


FIG. 5A

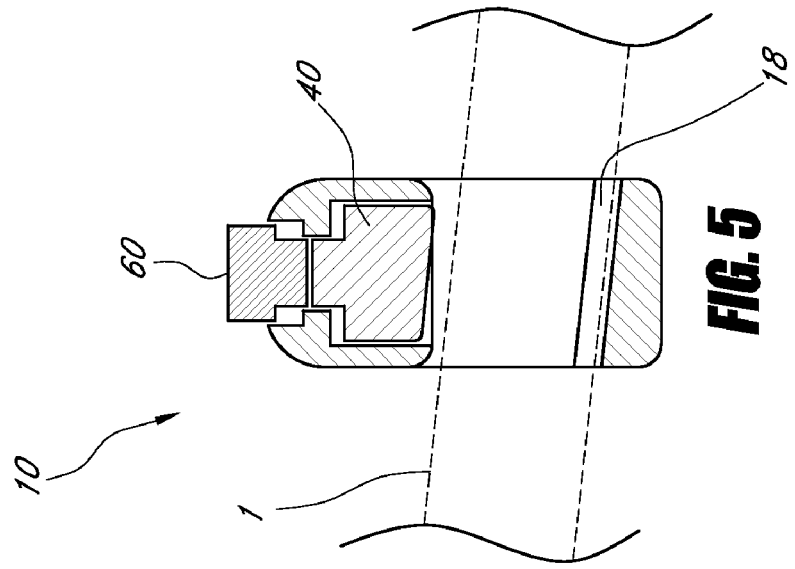


FIG. 5

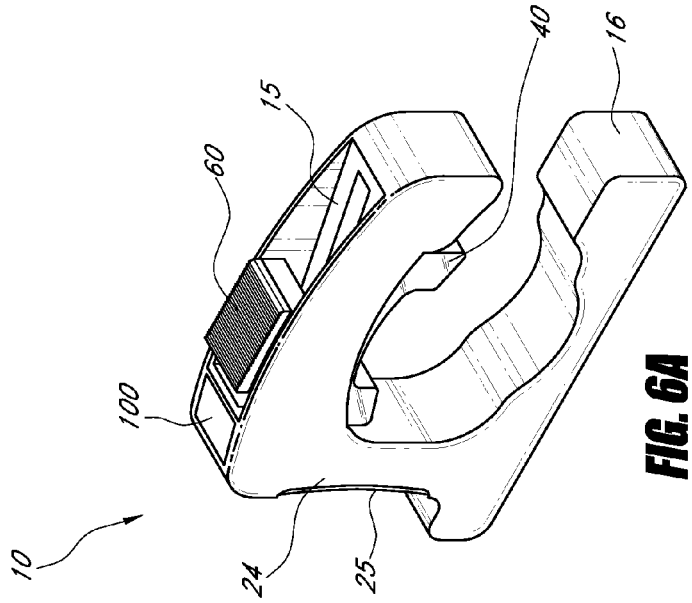

10
100
60
15
40
16
24
25

FIG. 6A

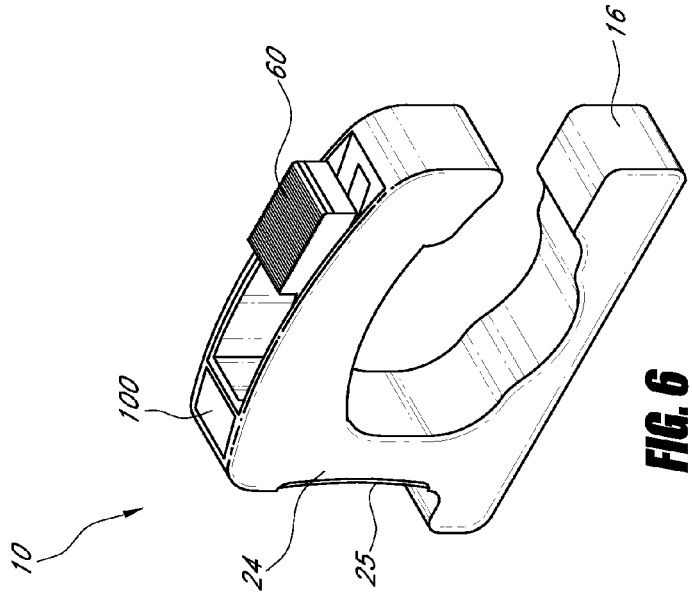
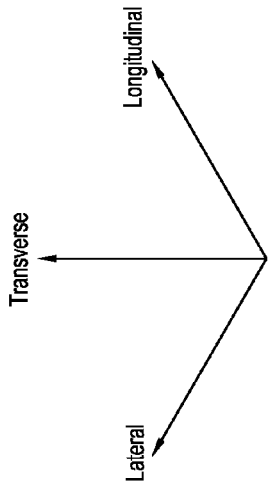

10
100
60
16
24
25

FIG. 6


Longitudinal
Transverse
Lateral

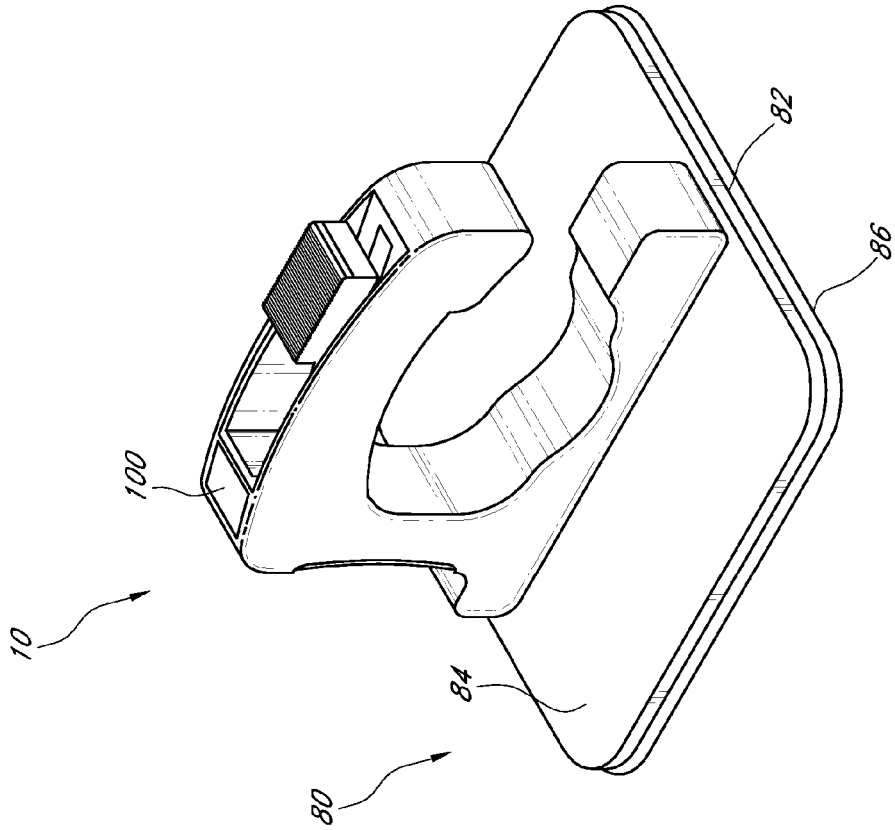


FIG. 7A

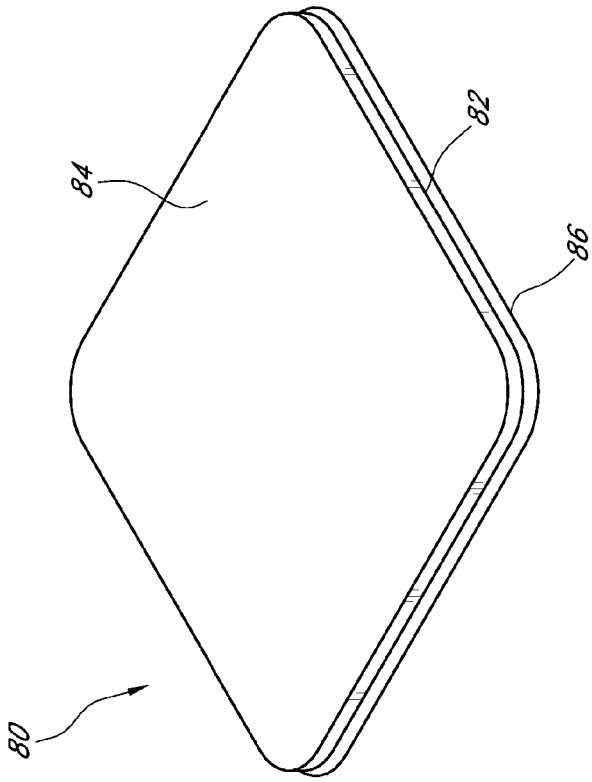


FIG. 7

ANCHORING SYSTEM

PRIORITY INFORMATION

This application is a continuation of U.S. patent application Ser. No. 13/452,291, filed Apr. 20, 2012, now U.S. Pat. No. 8,900,196, which claims the priority benefit under 35 U.S.C. §119(e) to U.S. Provisional Application No. 61/478,027, filed Apr. 21, 2011 and titled ANCHORING SYSTEM, the entirety of each of which is hereby expressly incorporated by reference herein.

BACKGROUND

1. Field

The present invention relates to anchoring systems. For example, the present invention may relate to a system for securing a medical article to a patient to inhibit movement or migration of the medical article relative to a patient.

2. Description of the Related Art

Hospitalized patients often have limited mobility due either to their condition or to doctor's orders. Such patients must lie in bed and not move about their hospital room, even to urinate. As such, various devices are used with bed-confined patient to drain various bodily fluids, or insert various forms of medicine or other substances into the body, as needed.

Often, a healthcare provider may secure tubes for draining and inserting such fluids to a patient using tape. For example, a healthcare provider may place long pieces of tape across the distal end of the tube in a crisscross pattern to secure the tube distal end to the inner thigh of the patient. This securement inhibits disconnection between the tube and the patient, as well as prevents the tube from snagging on the bed rail or other objects.

Taped connections, however, often collect contaminants and dirt. Normal protocol therefore requires periodic tape changes in order to inhibit bacteria and germ growth at the securement site. Frequent tape changes though lead to another problem: excoriation of the patient's skin. In addition, valuable time is spent applying and reapplying the tape to secure the catheter. And health care providers often remove their gloves when taping because most find the taping procedure difficult and cumbersome when wearing gloves. Not only does this further lengthen the procedure, but it also subjects the healthcare provider to possible infection.

SUMMARY

Embodiments can include several features for an anchoring system useful for the securement of a medical article to a patient's body. Without limiting the scope, certain prominent features will be discussed briefly. After considering this discussion, and particularly after reading the Detailed Description of Certain Preferred Embodiments section below in combination with this section, one will understand how some features and aspects of these embodiments provide several advantages over prior securement devices.

For example, in one embodiment a retainer secures a medical article to a patient. The retainer can include a first member defining at least a portion of a channel and having a receptacle. The channel can include a longitudinal axis and be configured to receive at least a portion of a medical article. The retainer further includes a second member. At least a portion of the second member is movably retained within at least a portion of the receptacle so as to move between a first position and a second position. The second member contacts at least a part of the received portion of the medical article at least when in the second position so as to inhibit longitudinal movement of the medical article through the channel.

In another embodiment, a securement device secures at least a portion of a medical article. The device includes a first arm having a guideway extending through the first arm and an engaging piece movably disposed within at least a portion of the guideway so as to at least move through the guideway and towards the medical article. The first arm further includes an actuator movably disposed within at least a portion of the guideway and coupled to the engaging piece so that movement of the actuator moves the engaging piece. The device further includes a second arm having a surface facing the first arm. The surface is configured to locate the medical article to be contacted by the engaging piece. The device further includes a connecting portion operatively connecting the first and second arms.

In another embodiment, a securement device secures at least a portion of a medical article. The device includes a first portion having a first contact surface for receiving a medical article and a second portion operatively fixed relative to the first portion and having a second contact surface. The second contact surface is disposed so as to oppose the first contact surface and define a receiving space therebetween. The device further includes a member movably coupled to the second portion so as to move between a first position and a second position. The member is closer to the first contact surface when in the second position than when in the first position. At least a part of the member extends into the receiving space at least when in the second position so as to contact at least a portion of the received medical article and inhibit longitudinal movement of the medical article through the receiving space.

In another embodiment, a method secures a medical article relative to a patient. The method includes providing a retainer forming a channel and having a first opening, a second opening, and an engaging piece. The first opening is in a side of the retainer. The engaging piece is movably disposed within at least a portion of the second opening. The method further includes passing at least a portion of the medical article through the first opening and into the channel so that at least a portion of the medical article is aligned with the second opening and moving the engaging piece through the second opening in a direction towards the portion of the medical article and into the channel. The method further includes contacting the medical article with the engaging piece so as to inhibit longitudinal movement of the medical article through the channel and securing the retainer relative to the patient.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the anchoring system disclosed herein are described below with reference to the drawings of preferred embodiments, which are intended to illustrate and not to limit the invention. Additionally, from figure to figure, the same reference numerals have been used to designate the same components of an illustrated embodiment. The following is a brief description of each of the drawings.

FIG. **1** is a front view of one embodiment of a securement device in an unsecured position according to a preferred embodiment of the present invention;

FIG. **1**A is a front view of the securement device of FIG. **1**, in a secured position;

FIG. **2** is a top view of the securement device of FIG. **1**, in the position depicted in FIG. **1**;

FIG. **2**A is a top view of the securement device of FIG. **1**, in the position depicted in FIG. **1**A;

FIG. **3** is a cross-sectional view of the securement device of FIG. **1**, in the position depicted in FIG. **1**;

FIG. **3**A is a cross-sectional view of the securement device of FIG. **1**, in the position depicted in FIG. **1**A;

FIG. **4** is a side view of the securement device of FIG. **1**, in the position depicted in FIG. **1**;

FIG. **4**A is a side view of the securement device of FIG. **1**, in the position depicted in FIG. **1**A;

FIG. **5** is a side cross-sectional view of the securement device of FIG. **1**, in the position depicted in FIG. **1**;

FIG. **5**A is a side cross-sectional view of the securement device of FIG. **1**, in the position depicted in FIG. **1**A;

FIG. **6** is a perspective view of the securement device of FIG. **1**, in the position depicted in FIG. **1**; and

FIG. **6**A is a perspective view of the securement device of FIG. **1**, in the position depicted in FIG. **1**A.

FIG. **7** is a perspective view of an anchor pad.

FIG. **7**A is a perspective view of the securement device of FIG. **1** mounted to the anchor pad of FIG. **7**.

DETAILED DESCRIPTION OF CERTAIN PREFERRED EMBODIMENTS

Certain preferred embodiments are described herein relating to the securement of a medical device to a patient. However, the principles of the inventions described herein are not limited to medical devices, nor to the securement of articles to a patient. For example, in some embodiments the inventions described herein can be used to secure electrical wires, ventilation conduits, or other articles to an inanimate body. Thus, the particular embodiments described herein and the context in which they are described should not be considered to limit the scope of the inventions disclosed herein.

Generally, the Figures are provided in pairs, each showing a distinct view of a securement device **10** in two positions, described herein as an unsecured position (e.g., FIG. **1**) and a secured position (e.g., FIG. **1**A), with the exception of FIGS. **7** and **7**A. However, in other embodiments additional positions may be provided. For example, as depicted in FIGS. **1** and **1**A, the securement device **10** is configured to secure a medical article **1** of a particular size. However, in other embodiments a similar securement device may be configured to secure two or more articles of different sizes, requiring similarly different positions. Further, in some embodiments a securement device may be configured to secure more than one device, and thus may require distinct positions to secure, for example, zero, one, or two of two total articles.

Further, as best shown by comparing FIGS. **1**A and **4**-**5**A, the secured article **1** is depicted as having a cylindrical shape. However, it will be understood that other shapes are possible, such as a polygonal colunmar shape, a conical shape, a cubic shape, a forked shape, or the like. In some embodiments the article **1** is a medical article such as a tube for a catheter. Exemplary secured articles include catheters and catheter hubs of various design, including central venous catheters, peripherally inserted central catheters, hemodialysis catheters, Foley catheters, as well as other designs of catheter hubs and catheter adaptors. Other medical articles may include surgical drainage tubes, feeding tubes, chest tubes, nasogastric tubes, rectal drains, external ventricular drains, chest tubes, any other sort of fluid supply or medical lines, connector fittings, and scopes, as well as electrical wires or cables connected to external or implanted electronic devices or sensors. The medical articles can each be a single medical article or a combination of medical articles.

As shown, for example, in FIGS. **1** and **1**A, the securement device **10** can comprise a generally C-shape structure. The securement device **10** can include a first arm **12**, a second arm **16**, and a connecting portion **24**. The first arm **12** can be an upper arm and, as discussed further below, can house an actuator **60** and an engagement piece **40**. The connecting portion **24** can serve to connect the first arm **12** and the second arm **16**. Further, the connecting portion **24** can comprise a curved portion **25** providing an improved ergonomic grip. Finally, the second arm **16** can be a lower arm.

The second arm **16** can additionally comprise a groove **18**. The groove **18** can be provided in a longitudinal direction to receive and align the article **1** passing longitudinally through the securement device **10**. In some embodiments, the groove **18** can further be shaped to generally match a portion(s) of the article **1** so as to improve the fit between these features. The second arm **16** can further comprise an external surface **20** depicted as a lower surface. Generally, this lower surface of the securement device **10** can be configured to engage with a surface on which the securement device **10** is configured to rest. For example, in some embodiments the securement device **10** may be configured to be applied to a patient via an anchor pad **80**, as depicted in FIGS. **7** and **7**A, or applied directly to the patient. For example, the lower surface **20** can comprise a bio-compatible adhesive or be configured to attach to another article secured to the patient. Further, in some embodiments the lower surface **20** may be shaped to improve securement, such as with a curved shape to match a curved surface.

For embodiments that include an anchor pad **80**, the size and shape of the anchor pad can vary depending on where the anchor pad is intended to be positioned on a patient. For example, in some embodiments the securement device **10** is intended for placement on a patient's hand and in other embodiments, the securement device **10** is intended for placement on a different part of a patient, for example, a patient's back. The anchor pad **80** may be any size or shape that allows attachment of the anchor pad to a patient's skin and that is configured to support at least the securement device **10**. The anchor pad **80** can be configured to support more than one securement device **10**. For example, as depicted in FIGS. **7** and **7**A, the anchor pad **80** has a square shape. Further, in FIGS. **7** and **7**A, the achor pad **80** is shown as holding only one securement device **10**, but has a size sufficient to hold more than one securement device.

The anchor pad **80** has a lower adhesive surface **82** for adhering to the skin of a patient and an upper surface **84**. The upper surface is configured to support at least the securement device **10**, as described above. In combination, the lower adhesive surface **82**, the upper surface **84**, and possibly one or more intermediate layers may comprise a laminate structure. A suitable laminate that comprises a foam or woven material with an adhesive layer is available commercially from Avery Dennison of Painsville, Ohio. The anchor pad **10** may be configured as a flexible structure configured to conform to the surface of a patient's skin.

The lower adhesive surface **82** or layer may be a medical-grade adhesive and can be either diaphoretic or non-diaphoretic, depending upon the particular application. The lower adhesive surface **82** may have additional types of medical adhesives laminated thereto. In some embodiments, the

lower adhesive layer **82** comprises an anti-bacterial or antimicrobial material. For example, the lower adhesive layer **82** may comprise one or more oligodynamic metal salts or oxides, or a combination of salts and oxides. In some embodiments, the lower adhesive layer **82** comprises a silver material, for example a silver salt, colloid, or complex. The adhesive layer **82** may be a solid layer or may be configured as an intermittent layer such as in a pattern of spots or strips. The lower adhesive layer **82** can be applied to the anchor pad **10** during manufacture, and may be further covered with a release liner **86**.

The upper surface **84** may comprise a foam (e.g., closed-cell polyethylene foam) or woven material (e.g., tricot) layer. A surface of the foam or woven material layer can constitute the upper surface **84** of the anchor pad **10**. In the alternative, the upper surface **84** may comprise an upper paper or other nonwoven cloth layer, and an inner foam layer may be placed between the upper surface and lower adhesive layer.

A removable release liner **86** may cover the lower adhesive layer **82** before use. The release liner **86** may resist tearing and be divided into a plurality of pieces to assist removal of the release liner and ease attachment of the anchor pad **80** to a patient's skin. The release liner **86** may be divided into two adjacent pieces. The liner **86** may be made of a paper, plastic, polyester, or similar material. For example, the release liner **86** may comprise a material made of polycoated, siliconized paper, or another suitable material such as high density polyethylene, polypropylene, polyolefin, or silicon coated paper.

The securement device **10** can form a central cavity or channel **26**. In the depicted embodiment, the central cavity **26** is substantially defined by the first arm **12**, second arm **16**, and the connecting portion **24**, although in other embodiments it can be substantially formed or defined by other sets of features. Further, as depicted, the central cavity **26** can extend in a longitudinal direction and include an opening **28**. The opening **28** may face any direction. Thus, in the depicted embodiment there is a plurality of techniques for inserting the article **1** into the central cavity **26**. In one method, the article **1** is inserted longitudinally, through the cavity **26**, independent of the opening **28**. However, this method might not be possible with some articles, such as articles that have ends sufficiently large to not fit through the central cavity **26**, even though a middle portion of the article can fit. In another method, the article **1** is inserted laterally, through the opening **28**. Inserting the article **1** laterally through the opening **28** can be accomplished even if ends of the article might not fit in the channel or central cavity **26**.

Inserting the article **1** laterally through the opening **28** may provide certain advantages with long and flexible articles, such as medical tubing. For example, a long article **1**, even if it fits, might dissuade insertion longitudinally (independent of the opening **28**) because this may require extensive threading to secure the article at a desired location potentially far from an end of the article.

Use of a flexible article during insertion laterally through the opening **28** can also provide for some additional securement independent of other mechanisms discussed herein. For example, if the size of the opening **28** is smaller than the natural size of the article **1**, the article **1** may need to be flexed or squeezed to fit through the opening **28** and into the cavity **26**. Similarly, the article **1** would need to be flexed or squeezed to be removed from the cavity **26** through the opening **28**. The forces necessary to allow such travel can provide some securement of the article **1** within the cavity **26**.

As best depicted in FIGS. **3**, **3**A, the article **1** is at least partially secured within the central cavity **26** of the securement device **10** by a movable engagement piece **40**. For example, as depicted the engagement piece **40** can include two projecting ends **42** configured to engage the constrained article **1**. In some embodiment, the projecting ends **42** can comprise a gripping surface that may comprise an adhesive, one or more ridges or bumps, or other features that may improve grip on the constrained article **1**. In this embodiment, the engagement piece **40** is provided within the first arm **12**, although in other embodiments it can be provided elsewhere in the device **10**. For example, the engagement piece **40** could be disposed in the connecting portion **24**.

The engagement piece **40** moves between locked and unlocked positions. For example, the engagement piece **40** can be partially constrained so it does not move in the lateral and longitudinal directions while being movable in the transverse direction. When in the locked position, a secured article **1** is prevented from moving in at least one direction by way of its engagement with the engagement piece **40**. In at least one embodiment, the engagement piece **40** primarily moves in a radial direction towards and away from the cavity **26** while being constrained from moving in the lateral and longitudinal directions. For example, the engagement piece **40** may slide in a transverse direction towards and away from a central axis of the cavity **26** while being constrained from moving in the longitudinal and lateral directions.

A portion of the engagement piece **40** may slide within one or more slots or grooves in the device **10**. These slots or grooves could extend in a transverse direction and be disposed in the first arm **12**. The portion of the engagement piece **40** which slides within the slot or groove could have the shape of a ridge, protrusion, pin, projection, or other like structure. The portion could be a separate structure attached to the engagement piece **40** or an integral portion of the piece. For example, the portion could be a pin projecting from a surface of the engagement piece **40**. A tongue and groove arrangement could be employed between the engagement piece **40** and the device **10**.

Alternatively or in addition, the entire engagement piece **40** may slide within a passage that has a cross-section that generally matches the cross-section of the engagement piece **40** without the need for a slot or groove.

Further, in the depicted embodiment the engagement piece **40** moves in a downward transverse direction into the cavity **26**, although in other embodiments the motion can be in other directions. The direction of the motion for the illustrated embodiment is at least partially defined by one or more pins **44**. The pins **44** can extend in the longitudinal direction from the engagement piece **40**, and correspond with grooves **46** formed within the body of the first arm **12**. Thus, the pins **44** can slide within the pin grooves **46** to constrain the motion of the engagement piece **40**. As the grooves **46** are depicted as straight and vertical, the motion of the engagement piece **40** can also be straight and vertical. However, in other embodiments these directions can vary.

Further, in some embodiments only one pin **44** and pin groove **46** can be provided. In such an embodiment, the engagement piece **40** can translate (with the pin **44**) through the pin groove **46**. The engagement piece **40** could additionally be able to rotate about the pin **44** within the groove **46**. The engagement piece **40** could then rotate to better insure that both of the two projecting ends **42** contact the constrained article **1**. For example, in embodiments where the article **1** is asymmetric or rests off-center from the engagement piece **1**, it would be possible for only one projecting end **42** to contact the article **1**, absent the ability

to rotate. Thus, in some embodiments, only one pin-groove combination will be provided.

It will be understood that the depicted embodiment could also include **4** pins **44** and pin grooves **46**, instead of only two. For example, an additional pair may be provided on an opposite side of the cross-section shown in FIGS. **3**, **3**A. This additional pair may be symmetric to the shown pair, such that a cross-section in the opposite direction would look substantially the same. Thus, in similar embodiments there may be two symmetrical pins **44** and pin grooves **46**, which still allow rotation as described above. Similarly, in some embodiments there may be only one pin **44** that extends across the entire engagement piece **40** to enter two grooves **46** on opposite sides of the engagement piece **40**. It will be understood that further variations are considered part of some embodiments of the inventions described herein. For example, in some embodiments the pin(s) can be provided on the first arm **12** and the groove(s) can be provided on the engagement piece **40**.

Further, in some embodiments the engagement piece **40** can be biased to move towards an unlocked position (upward in the depicted embodiment) or towards a locked position. Such biasing can be provided, for example, by a spring such as a leaf spring. The spring can contact the pins **44**, the main body of the engagement piece **40**, or some other portion to bias the engagement piece **40**. Biasing the engagement piece **40**, in some embodiments, will advantageously facilitate insertion of an article **1**, prior to securement.

The engagement piece **40** can be secured against the article **1** with the assistance of an actuator **60**. The motion of the actuator **60** can be constrained in a similar manner as the motion of the engagement piece **40**, using pins **64** and pin grooves **46** that can be positioned, shaped, substituted, and varied in similar ways. Notably, in the depicted embodiment only one pin **64** and groove **66** is shown. Further, as shown, the pin **64** is part of the first arm **12** and the groove **66** is part of the actuator **60**. Additionally, the depicted embodiment includes a ramp **15** that can be molded into the first arm **12**. As shown, the ramp **15** can provide a restraint against rotation of the actuator **60**, and further reinforce its path of motion such that the actuator **60** can slide along the ramp **15**. As best shown in FIGS. **2**, **2**A, the ramp **15** can be provided on opposite sides of the actuator **60**, with a guideway **14** in the middle.

The guideway **14** can be part of the first arm **12**, and can provide a further limitation on the path of both the actuator **60** and the engagement piece **40**. More generally, the guideway **14** can provide a space for the actuator **60** and the engagement piece **40**. Further, the walls of the guideway **14** can restrain the longitudinal movement of the actuator **60** and the engagement piece **40**.

In operation, the actuator **60** can be pushed into the engagement piece **40** (downward in the depicted embodiment). In the depicted embodiment, such motion of the actuator **60** can be facilitated by a grip surface **62** on the top of the actuator **60**. As is most clearly illustrated in FIG. **3**, the actuator **60** includes an actuation surface **68**. The actuation surface **68** contacts an actuation surface **48** of the engagement piece **40**. This contact can then provide a force between the two pieces to push the engagement piece **40** into the cavity **26**, and onto the article **1** to be secured. In other embodiments transmission of forces between the actuator **60** and the engagement piece **40** can be provided in other manners. For example, in some embodiments the actuator **60** and the engagement piece **40** can be physically connected, such that the actuator can retract the engagement piece **40**. In another embodiment, the pieces can interact through magnetic forces. In even further embodiments, the pieces can become reversibly or irreversibly attached only upon initial contact.

In some embodiments, mechanisms may be provided to prevent the engagement piece **40** from moving to the unlocked position (e.g., upward in the depicted embodiment). For example, in some embodiments resistance from the article **1** itself may push the engagement piece **40** away. In other embodiments, the action of a spring biasing the engagement piece **40** out of the cavity **26** may provide a similar effect. Thus, in some embodiments a ratcheting mechanism can be provided between the actuator **60** or the engagement piece **40** and the first arm **12** to resist such movement. In other embodiments, frictional resistance can be provided between the actuator **60** or the engagement piece **40** and the first arm **12** to resist such movement absent a higher force. In even further embodiments, an additional device or feature can be provided to restrain the actuator **60** or the engagement piece **40** such as a latch, a magnetic force, an adhesive, a tie, or the like.

Further, as depicted, the engagement piece **40** can comprise two or more projecting ends **42**, forming a multi-pronged structure. Advantageously, a two-pronged structure, in combination with the second arm **16** (e.g., the groove **18** thereof), can provide for three points of contact with the article **1** (one on each projecting end **42**, and a third on the second arm **16**). Such a 3-point securement system can constrain a wide variety of articles of varying shape and size.

Additionally, as best depicted in FIGS. **4**-**5**A, in some embodiments a central axis through the channel or cavity **26** of the securement device **10** is not parallel to the external surface **20** of the securement device **10**. Such an arrangement provides an incident angle for the article **1** to enter the patient's skin. For example, as depicted, a portion of the second arm **16** facing the cavity (e.g., the groove **18**) is an angle with respect to the external surface **20**.

The desired angle between the article **1** and the patient is created by angling the axis of the channel or cavity **26**. This angle is selected in order to align the axis of the channel or cavity **26** of the device **10** with the desired incident angle with which the medical article is to contact the skin of the patient. A variety of different angles can be used, ranging from 0° to 45°, and more preferably from so to 25°. For instance, for the securement of intravenous catheters, it is desirable for the angle of incidence of the catheter to the skin of the patient to be between about 7° to about 15°. For the securement of arterial catheters, it is desirable for the angle of incident of the catheter to the skin of the patient to be about 12.5°. By angling the axis of the channel or cavity **26** at the desired angle, which will depend upon the particular securement application (e.g., securing an arterial catheter, an intravenous catheter, etc.), the proper angle of incidence for a catheter can be maintained.

Similarly, as shown, the surfaces of the projecting ends **42** can also be provided at an angle. In some embodiments this angle can match the angle of the axis through the cavity or channel **26**.

The securement device **10** can optionally include one or more timers. The timer is disposed on the securement device **10** so as to be accessible by the healthcare provider. In some embodiments, the timer is disposed on an outer surface of the securement device **10** and optionally includes a display. By way of example, the display can be included or integrated with additional electronics **100** or other ancillary elements on the securement device **10**.

The timer may be configured to measure elapsed time and can be activated manually by a user, remotely by a user,

and/or by a triggering event. For example, the connection of one or more medical articles to the securement device **10** and/or the passage of fluid through a lumen in the securement device **10** can activate the timer. The timer indicates a time-based characteristic of the medical article or line, such as, for example, the length of time the medical article or line has been in place on the patient. In some implementations, the timer measures a flow rate of fluid into the patient and compares the measured flow rate to a target flow rate. Thus, the timer may be used to verify that lumens of the medical lines, securement device, and/or catheter are not occluded or partially occluded.

The timer can be flexible or rigid, and can be disposed directly on the securement device **10**. In some embodiments, the timer is disposed on the anchor pad **80** (possibly with other ancillary elements). By prominently positioning the timer, the timer can provide an easy-to-use and reliable visual indicator of elapsed time. The timer can be a battery-operated timer or a chemically-active timer. Embodiments of a chemically active timer can change color or provide another visual response when exposed to air or a selected chemical for a given length of time.

In some implementations, the timer is activated by a healthcare provider at generally the same time the provider begins passing a fluid through the secured article **1**. The activated timer may then provide a visual indication of the length of time elapsed or period since the catheter was connected to the securement device **10**. The timer may provide, in addition to or instead of a visual response, an audible indication or alarm of a given length of time. For example, the timer may beep, chirp, or otherwise emit sound.

The period between indication outputs from the timer can be fixed or variable. For example, the timer can provide an indication after a first time period and then provided a second indication after a second time period. The first and second time periods may have the same or different durations. The first indication may be the same or different than the second indication. For example, the timer can provided an audible indication after the first time period and a visual indication after the second time period. Thus, the timer can be used to signal when the medical line should be replaced and/or re-sited.

The securement device **10** can optionally include one or more flow sensors or meters configured to sense a rate of fluid flow through the secured article **1** (e.g., as one of the above-referenced ancillary features, optionally provided with the electronics **100**). In one embodiment the flow sensor detects flow using an optical sensor. The sensor may rely in part on the size, shape, and/or cross-section of the channel **26** to determine the flow rate. For example, the securement device **10** can include a flow sensor to measure a rate of infusate flow through the article **1**. The one or more flow sensors can be configured to provide an audible or visual indication or alarm when a flow rate through the constrained article **1** exceeds a given threshold or is below a given threshold. For example, a flow sensor can be configured to provide an audible alarm when a flow rate through the article **1** is below a certain threshold such that the patient is not receiving sufficient fluid or infusate delivery.

The optional timers and/or flow sensors can include stored memory elements including one or more libraries of stored settings. For example, drug or medication libraries with stored settings relating to each individual drug or medication can be stored on memory elements to provide threshold values to the optional timers and/or flow sensors. In some embodiments, such memory elements can be configured to trigger an audible or visual indication or alarm when a given dosage has been met and/or when a pressure or flow characteristic of a given infusate deviates from an expected value.

Although this invention has been disclosed in the context of certain preferred embodiments and examples, it will be understood by those skilled in the art that the present invention extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses of the invention and obvious modifications and equivalents thereof. In addition, while a number of variations of the invention have been shown and described in detail, other modifications, which are within the scope of this invention, will be readily apparent to those of skill in the art based upon this disclosure. It is also contemplated that various combinations or sub-combinations of the specific features and aspects of the embodiments may be made and still fall within the scope of the invention. Accordingly, it should be understood that various features and aspects of the disclosed embodiments can be combined with or substituted for one another in order to form varying modes of the disclosed invention. Thus, it is intended that the scope of the present invention herein disclosed should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the disclosure and the claims that follow.

What is claimed is:

1. A retainer for securing a medical article to a patient, the retainer comprising:

a first member defining a portion of a channel and including a receptacle, the channel configured to receive at least a portion of the medical article;

a second member having a portion movably retained within a portion of the receptacle to move between a first position and a second position, the second member contacting a part of the received portion of the medical article when in the second position to inhibit longitudinal movement of the medical article through the channel; and

an actuator configured to move the second member from the first position to the second position.

2. The retainer according to claim **1**, wherein the second member extends into the channel when in the second position.

3. The retainer according to claim **1**, wherein the receptacle extends through the first member.

4. The retainer according to claim **1**, wherein the second member passes through the receptacle when the second member moves from the first position to the second position.

5. The retainer according to claim **1**, wherein the first member surrounds the receptacle.

6. The retainer according to claim **1**, wherein the first member comprises a first arm, a second arm, and a connecting portion.

7. The retainer according to claim **6**, wherein the receptacle is disposed in the first arm.

8. The retainer according to claim **6**, wherein the receptacle is disposed in the connecting portion.

9. The retainer according to claim **1**, wherein the second member moves in a first direction between the first position and the second position and the actuator moves in a second direction different than the first direction.

10. The retainer according to claim **9**, wherein the first direction is a radial direction with respect to a longitudinal axis through the channel.

11. The retainer according to claim 1, wherein the second member slidingly engages with the first member.

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