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(54) **EXCHANGEABLE NEEDLE SAFETY MECHANISM**

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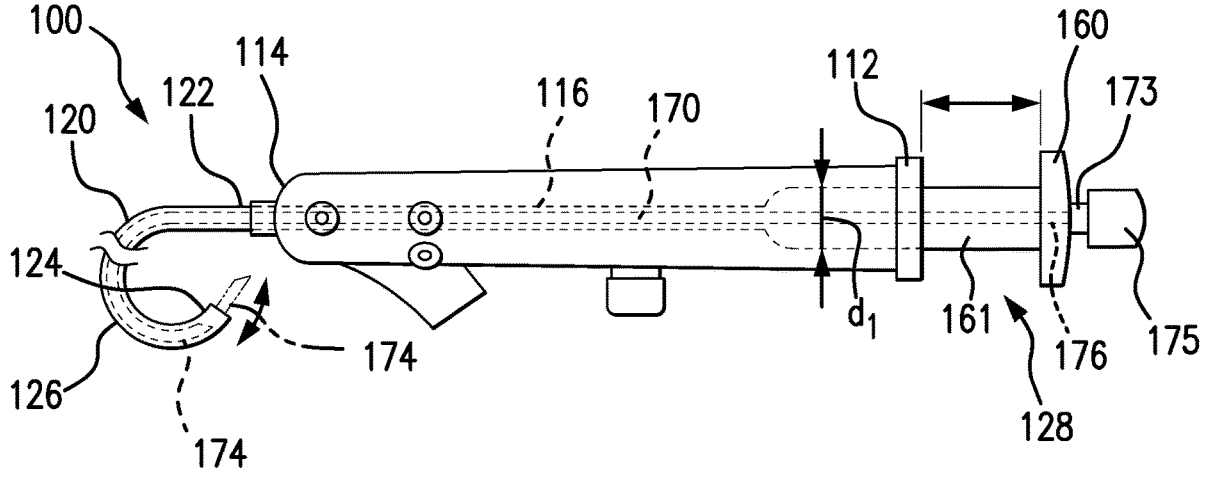
(52) **U.S. Cl.**

CPC ***A61B 10/0233*** (2013.01); ***A61B 10/04*** (2013.01); ***A61M 5/321*** (2013.01); ***A61M 5/3213*** (2013.01); *A61B 2010/045* (2013.01); *A61B 17/3403* (2013.01); *A61B 2017/3413* (2013.01); *A61B 17/3496* (2013.01)

(57) **ABSTRACT**

The present disclosure relates generally to the field of medical devices. In particular, the present disclosure relates to medical devices and methods that include needle guards configured to shield the sharpened distal end of exchangeable biopsy needles. The biopsy needles may be used for tissue biopsy and sampling under radial ultrasound guidance.



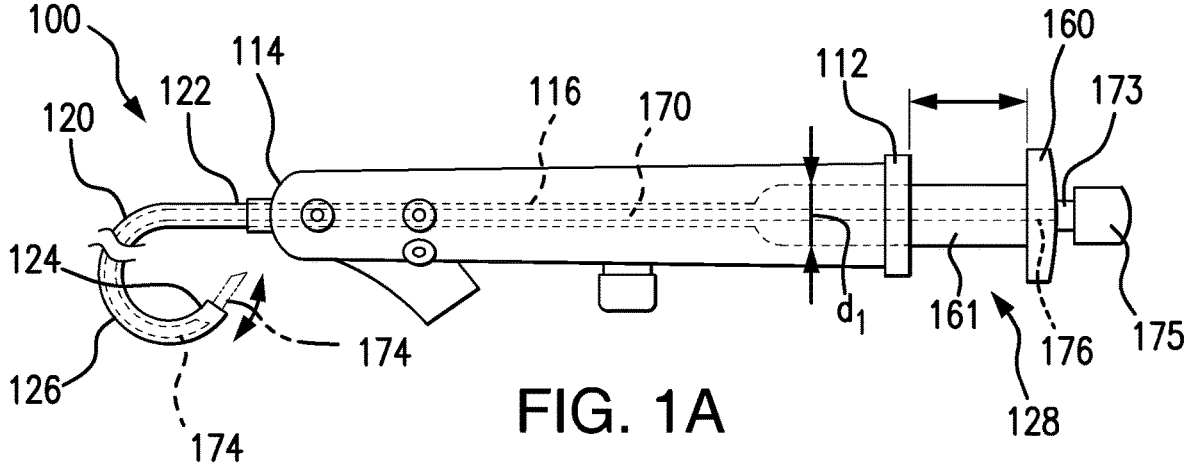

100
114
122
120
116
170
112
160
173
124
174
126
174
d_1
161
176
175
128

FIG. 1A

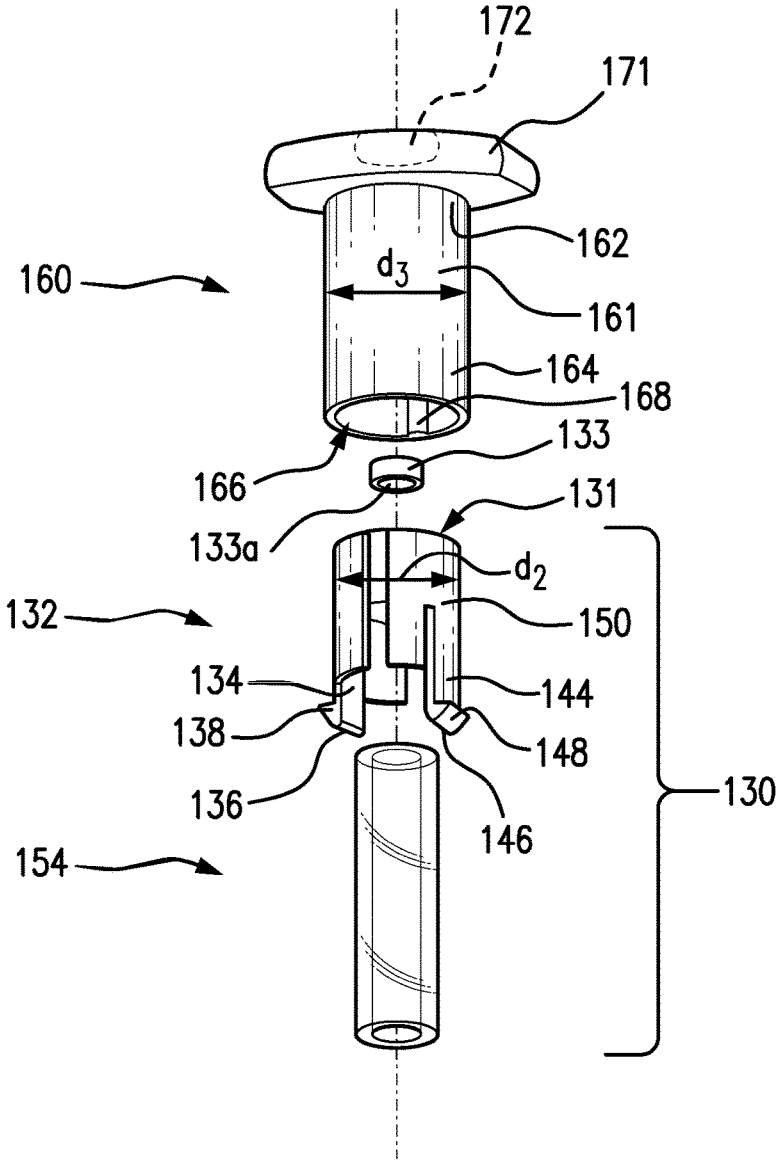

172
171
162
160
d_3
161
164
168
133
166
131
133a
d_2
132
150
134
144
138
148
136
146
130
154

FIG. 1B

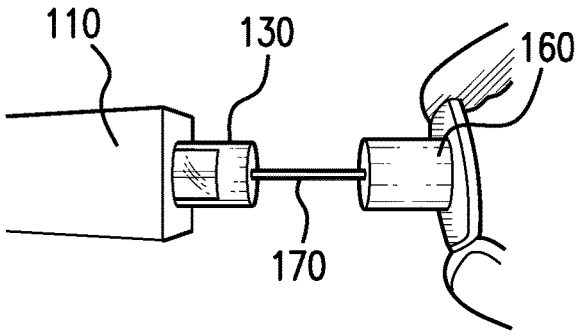


FIG. 2A

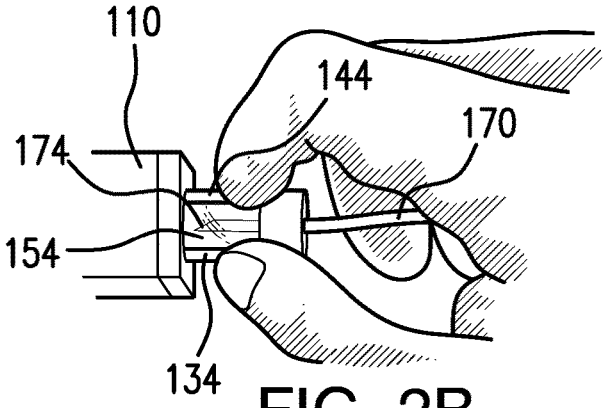


FIG. 2B

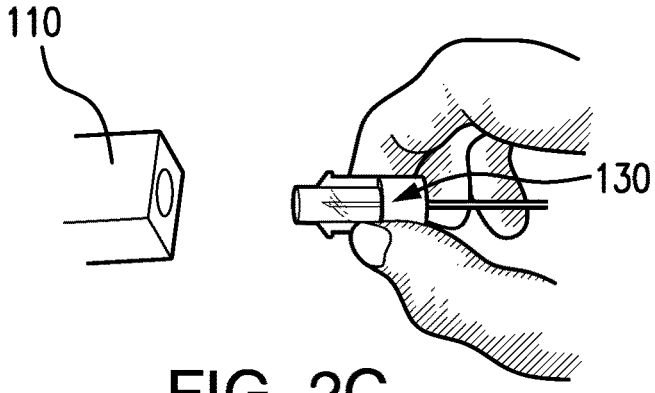


FIG. 2C

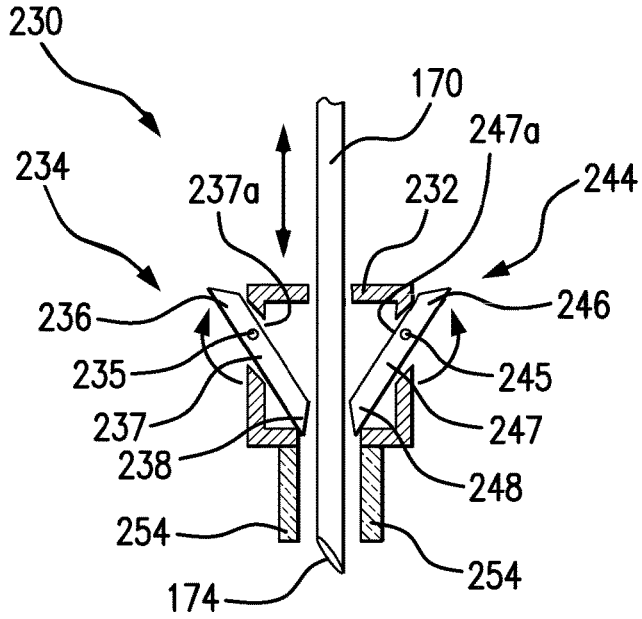


FIG. 3A

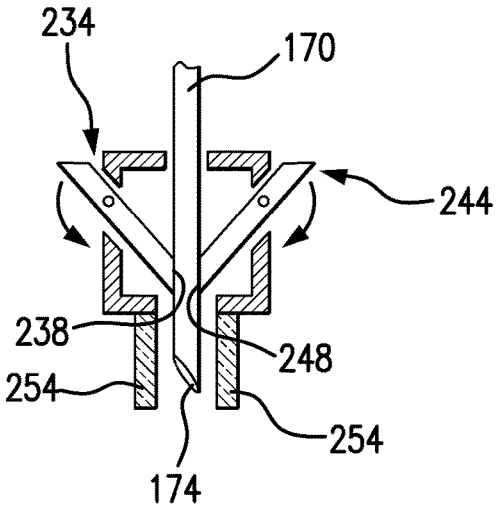


FIG. 3B

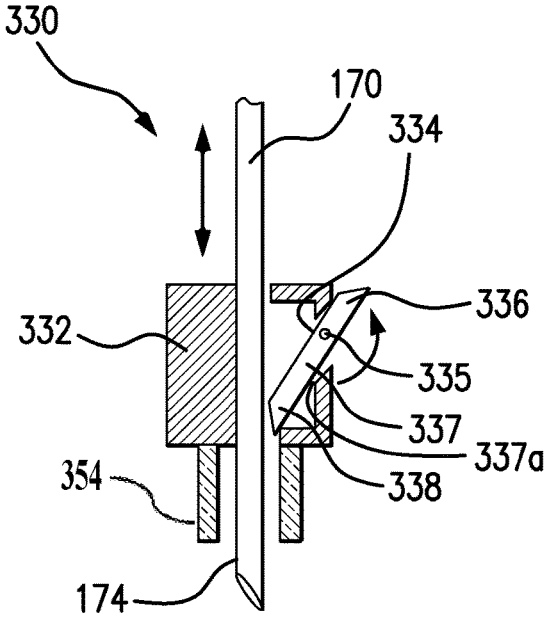


FIG. 4A

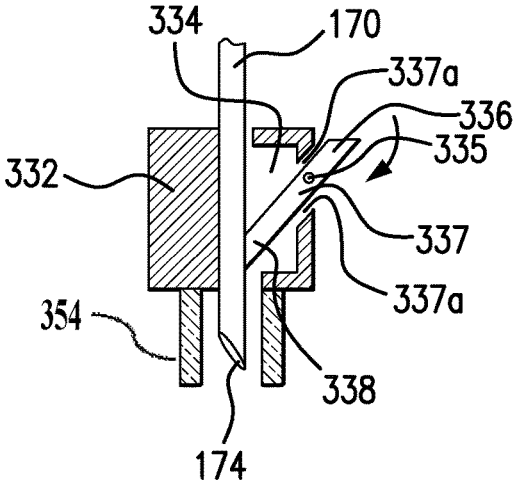


FIG. 4B

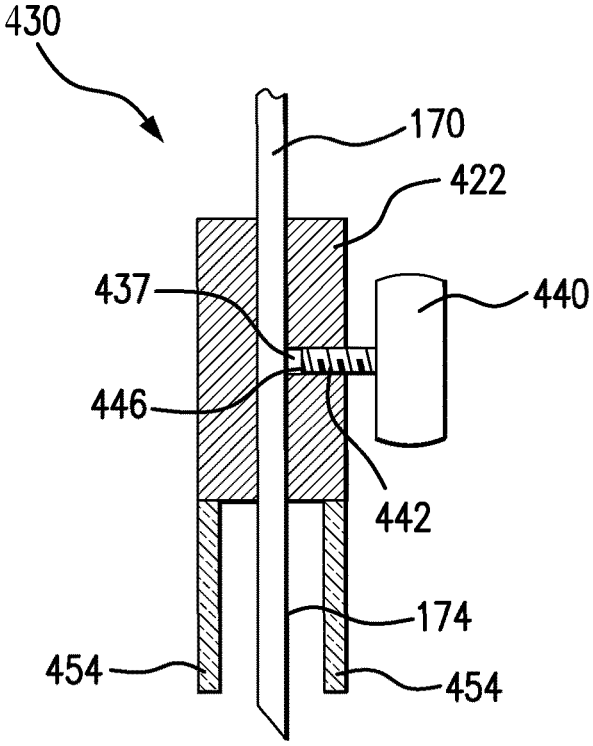

430
170
422
437
440
446
442
174
454
454

FIG. 5A

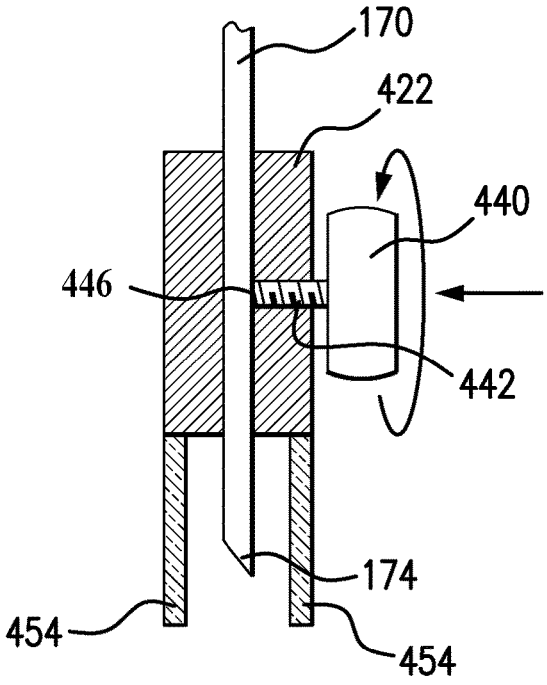

170
422
440
446
442
174
454
454

FIG. 5B

EXCHANGEABLE NEEDLE SAFETY MECHANISM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Non-Provisional patent application Ser. No. 16/115,935, filed Aug. 29, 2018, which claims the benefit of priority under 35 U.S.C. § 119 to U.S. Provisional Patent Application Ser. No. 62/552,230, filed on Aug. 30, 2017, which is incorporated by reference in its entirety for all purposes.

FIELD

[0002] The present disclosure relates generally to the field of medical devices. In particular, the present disclosure relates to medical devices and methods that include needle guards configured to shield the sharpened distal end of exchangeable biopsy needles. The biopsy needles may be used for tissue biopsy and sampling under radial ultrasound guidance

BACKGROUND

[0003] As an example of systems utilizing exchangeable needles, endoscopic ultrasound biopsy systems, such as the Expect™ and Expect Slimline systems (Boston Scientific Corp., Marlborough MA) and Beacon™ system (Medtronic, Minneapolis MN), allow biopsy samples to be obtained from potentially cancerous pulmonary nodules under radial ultrasound guidance. These systems include exchangeable needles to eliminate the need for the entire system to be removed from the patient, e.g., through the endoscope working channel, after each biopsy sample is taken. Exchangeable needles improve procedure time by allowing a second biopsy sample to be taken while the previous sample is expelled for analysis, and improve efficiency by maintaining the ultrasound image of the target nodule throughout the procedure. Once the needle is removed from the biopsy system, the exposed needle tip poses a puncture/needle-stick risk to medical professionals in the operating room and/or technicians in the diagnostic laboratory.

[0004] A variety of advantageous medical outcomes may therefore be realized by the devices and/or methods of the present disclosure, which provide the combined benefits of an exchangeable biopsy needle with needle guards that shield the exposed needle tip while still allowing the biopsy sample to be expelled for analysis.

SUMMARY

[0005] In one aspect, the present disclosure relates to a needle guard comprising a housing. First and second flexible arms may extend distally from a proximal end of the housing. A gasket may be disposed within an opening in the housing and a hollow tube may be attached to the housing between the first and second flexible arms. A distal end of the first flexible arm may include a first tab, and a distal end of the second flexible arm may include a second tab. The gasket may include an opening configured to slidably receive an outer surface of a needle. The opening of the gasket may be configured to frictionally engage the other surface of the needle. At least a portion of the hollow tube may comprise an optically translucent material. The needle guard may further include a needle attachment component comprising a cylinder and a grip, wherein an inner surface of the cylinder may be configured to frictionally engage an outer surface of the housing. The first and second flexible arms may be configured to move between a first position and a second position. The first and second flexible arms may be configured to extend through an opening formed in a proximal end of a medical device. The first and second tabs may contact an inner surface of the medical device when the first and second arms are in the first position. The first and second tabs may not contact an inner surface of the medical device when the first and second arms are in the second position.

[0006] In another aspect, the present disclosure relates to a needle guard comprising a housing. A first wing may extend through a first opening in the housing, wherein a middle portion of the first wing may be pivotally attached to the housing and the first wing may be configured to move between a first position and a second position. A second wing may extend through a second opening in the housing, wherein a middle portion of the second wing may be pivotally attached to the housing and the second wing may be configured to move between a first position and a second position. A hollow tube may be attached to the housing. The housing and hollow tube may be configured to receive a needle therethrough. A surface of the first and second wings may not contact an outer surface of the needle when in the first positon. A surface of the first and second wings may not contact the outer surface of the needle when in the second position. The first and second wings may lock a portion of the needle within the housing when in the second position. The portion of the needle locked within the housing may include a sharpened distal end of the needle.

[0007] In another aspect, the present disclosure relates to a needle guard comprising a housing. A single wing may extend through an opening in the housing, wherein a middle portion of the first wing may be pivotally attached to the housing and the single wing may be configured to move between a first position and a second position. A hollow tube may be attached to the housing. The housing and hollow tube may be configured to receive a needle therethrough. A surface of the single wing may not contact an outer surface of the needle when in the first positon. The single wing may lock a portion of the needle within the housing when in the second position. The portion of the needle locked within the housing may include a sharpened distal end of the needle.

[0008] In yet another aspect, the present disclosure relates to a needle guard comprising a housing. A rod including a threaded surface may extend through an opening in the housing. An inner surface of the opening may include a grooved surface corresponding to the threaded surface. A hollow tube may be attached to the distal end of the housing. The housing and hollow tube may be configured to receive a needle therethrough. Rotating the rod in a first direction may move an end of the rod toward an interior of the housing, and rotating the rod in a second direction may move the end of the rod away from the interior of the housing. Rotating the rod in the first direction may place the end of the rod in contact with an outer surface of the needle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Non-limiting embodiments of the present disclosure are described by way of example with reference to the accompanying figures, which are schematic and not intended to be drawn to scale. In the figures, each identical or nearly identical component illustrated is typically represented by a single numeral. For purposes of clarity, not every

component is labeled in every figure, nor is every component of each embodiment shown where illustration is not necessary to allow those of ordinary skill in the art to understand the disclosure. In the figures:

[0010] FIGS. **1**A-**1**B provide perspective views of medical device (FIG. **1**A) and needle guard and needle attachment component (FIG. **1**B), according to one embodiment of the present disclosure.

[0011] FIGS. **2**A-**2**C provide perspective views of a needle guard, according to one embodiment of the present disclosure.

[0012] FIGS. **3**A-**3**B provide perspective views of a needle guard, according to one embodiment of the present disclosure.

[0013] FIGS. **4**A-**4**B provide perspective views of a needle guard, according to one embodiment of the present disclosure.

[0014] FIGS. **5**A-**5**B provide perspective views of a needle guard, according to one embodiment of the present disclosure.

DETAILED DESCRIPTION

[0015] The present disclosure is not limited to the particular embodiments described herein. The terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting beyond the scope of the appended claims. Unless otherwise defined, all technical terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the disclosure belongs.

[0016] Although embodiments of the present disclosure are described with specific reference to medical devices and methods for acquiring biopsy samples from a pulmonary nodule under radial ultrasound guidance, it should be appreciated that such device and methods may be used in a variety of medical procedures where there is a need for exchangeable or single-use needles with needle guards that shield the exposed needle tip while still allowing the needle tip to be accessible, including, for example, in endoscopy procedures, intravenous procedures, etc.

[0017] As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," or "includes" and/or "including" when used herein, specify the presence of stated features, regions, steps elements and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components and/or groups thereof.

[0018] As used herein, the term "distal" refers to the end farthest away from the medical professional when introducing a device into a patient, while the term "proximal" refers to the end closest to the medical professional when introducing a device into a patient.

[0019] In various embodiments, the present disclosure relates to devices and methods to shield the exposed tip of an exchangeable biopsy needle following removal from the patient. Referring to FIG. **1**A, in one embodiment, a medical device **100** of the present disclosure may include a handle **110** comprising a channel **116** extending between a proximal opening **112** and a distal opening **114**. A catheter **120** comprising a proximal end **122**, a distal end **124** and lumen **126** extending therebetween, may be attached to the handle **110** such that the lumen **126** is contiguous with the channel **116**. The proximal opening **112** of the handle **110** may include an inner dimension d_1 sized and configured to receive at least a portion of a biopsy needle actuation mechanism **128**.

[0020] Referring to FIG. **1**B, in one embodiment, the biopsy needle actuation mechanism **128** may include a needle guard **130** and a needle attachment component **160**. The needle guard **130** may include a housing **132** comprising an opening **131** extending therethrough. A gasket **133**, or other friction creating component, may be disposed within the opening **131**. The gasket **133** may include an opening **133***a* sized and configured to frictionally engage an outer surface of a biopsy needle, as discussed below. First and second flexible arms **134**, **144** may extend distally from the housing **132**. A distal end **136** of the first flexible arm **134** may include a tab **138**, and a distal end **146** of the second flexible arm **144** may include a tab **148**. The first and second flexible arms **134**, **144** may be configured to move between a relaxed first position and a second position. For example, a force applied by the fingers of a user may compress the first and second flexible arms **134**, **144** to deflect inward. The tabs **138**, **148** may be configured to reversibly engage an inner surface of the handle of the medical device adjacent to the proximal opening **112**, when the first and second flexible arms are in the first position.

[0021] The needle attachment component **160** may include a cylinder **161** comprising a proximal end **162**, a distal end **164** and a lumen **166** extending therebetween. The cylinder **161** may include an outer dimension d_3 sized and configured to fit within the proximal opening **112** of the handle **110**. A grip **171** may be attached to, or integrally formed with, the proximal end **162** of the cylinder **161**. The grip **171** may extend substantially perpendicular to the cylinder **161** and include an opening **172** contiguous with the lumen **166**. The housing **132** may include an outer dimension d_2 sized and configured to be frictionally received within the lumen **166** of the cylinder **161**. For example, an outer surface **150** of the housing **132** may form an interference fit with an inner surface of the cylinder **161**. In various embodiments, the interference fit may be sufficiently strong to prevent the needle guard **130** and needle attachment component **160** from separating from each other during a biopsy procedure (e.g., as the needle actuation mechanism is advanced and retracted within the proximal opening **112** of the handle **110**), but sufficiently weak to allow separation, e.g., using the force applied by a user's fingers on the first and second flexible arms **134** and **144**. In one embodiment, the outer surface **150** of the housing **132** may include a longitudinal groove or recess (not shown) configured to receive a corresponding longitudinal ridge or protrusion **168** on an inner surface of the cylinder **161**. In addition to providing a friction or interference fit between the cylinder **161** and housing **132**, the groove and protrusion **168** may provide a "keyed" fit to prevent rotation between the needle guard **130** and needle attachment component **160**, and to maintain proper orientation of the biopsy needle, discussed below.

[0022] The needle guard **130** may further include an open-ended hollow tube **154** attached to, or integrally formed with, the housing **132**. The hollow tube may extend distally beyond the distal ends **136**, **146** of the first and second flexible arms **134**, **144**. At least a portion of the hollow tube **154** may comprise an optically translucent

material (e.g., glass, plastic, rubber, etc.) to allow a user to visualize the sharpened end of a biopsy needle disposed therein, as discussed below.

[0023] Referring again to FIG. **1**A, in one embodiment, a biopsy needle **170** comprising a proximal end **176** and a sharpened distal end **174** may be disposed within the medical device **100**. For example, the sharpened distal end **174** may be inserted into the opening **172** formed within the grip **171** and advanced distally to pass through the lumen **166** of needle attachment component **160**, the housing **132**, gasket **133** and hollow tube **154** of the needle guard, the channel **116** of the handle **110** and the lumen **126** of the catheter **120**. The proximal end **176** of the biopsy needle **170** may be attached to a needle hub **173** configured to secure or lock the biopsy needle **170** to the grip **171**. The needle hub **173** may further include a stylet attachment **175** configured to removably secure a stylet (not shown) within the biopsy needle **170**.

[0024] In one embodiment, the medical device **100** may be assembled by positioning the needle guard **130** within the proximal opening **112** of the handle **110** to place the tabs **138**, **148** of the first and second flexible arms **134**, **144** in contact with the inner surface of the handle **110** adjacent to the proximal opening **112**. The needle attachment component **160** may then be secured to a portion of the housing **132** of the needle guard **130** extending proximally beyond the handle **110** by aligning the corresponding groove (not shown) and ridge **168**, and advancing the cylinder **161** over the housing **132**. A biopsy needle **170** and stylet (not shown) may then be advanced through the medical device **100** to position the sharpened distal end **174** within the catheter **120** at or near the distal end **124**, and the needle hub **173** at the proximal end of the biopsy needle **170** secured to the grip **171**.

[0025] In use, and by way of example, the catheter may be inserted into a pulmonary passage of a patient through a working channel of an endoscope and adjacent to a target pulmonary nodule. The stylet may then be removed and the biopsy needle **170** advanced from within the lumen **126** of the catheter **120** into the target pulmonary nodule by advancing/depressing the needle actuation mechanism **128** into the handle **110**. For example, a user may grasp the handle **110** with their hand and depress the grip **171** with one or more fingers to move the cylinder **161** into and through the proximal opening **112**. In one embodiment, the needle actuation mechanism **128** may be spring loaded and return to the non-deployed position when released by the user. The tabs **138**, **148** on the first and second flexible arms **134**, **144** may engage the inner surface of the handle **110** to prevent the needle actuation mechanism **128** and handle **110** from detaching when in the non-deployed position. The user may depress and release the needle actuation mechanism **128** as many times as necessary to acquire sufficient tissue for analysis.

[0026] Referring to FIGS. **2**A-**2**C, in one embodiment, when the user determines that the biopsy needle contains a sufficient amount of tissue from the target pulmonary nodule, the grip **171** may be proximally withdrawn with sufficient force to separate the needle attachment component **160** from the needle guard **130** (FIG. **2**A). The needle attachment component **160** may be further proximally withdrawn until the sharpened distal end **174** of the biopsy needle is disposed within a portion of the hollow tube **154** of the needle guard extending proximally beyond the handle **110**. The first and second flexible arms **134**, **144** may then be depressed or squeezed, e.g. between a user's thumb and forefinger, to disengage the tabs **138**, **148** (FIG. **1**B) from the inner surface of the handle **110** (FIG. **2**B) and remove the needle guard **130** from the handle **110** (FIG. **2**C). In various embodiments, the gasket **133** (FIG. **1**B) disposed within the housing **132** of the needle guard **130** may be configured to engage the outer surface of the biopsy needle **170** with sufficient frictional force to maintain the sharpened distal end **174** within the hollow tube **154**. The tissue sample may then be expelled from the biopsy needle **170** while the sharpened distal end **174** remains safely housed within the hollow tube **154**. In addition, or alternatively, the biopsy needle **170** may be advanced distally, e.g., along the hollow tube of the needle guard **130**, if it is necessary to position the sharpened distal end **174** closer to, or distally beyond, the hollow tube **154**.

[0027] Although the needle guard **130** of FIG. **1**A includes first and second flexible arms **134**, **144** extending from opposite sides of the housing **132**, in various embodiments, the needle guard may include any number of arms disposed in a variety of patterns and/or configurations along or about the housing **132**. In various other embodiments, the needle guard **130** may be removably attached to the handle **110** by corresponding threaded or luer-lock connectors, or the like.

[0028] Referring to FIGS. **3**A-**3**B, in one embodiment, a needle guard **230** of the present disclosure may include a housing **232** comprising first and second wings **234**, **244** configured to maintain the sharpened distal end **174** of the biopsy needle **170** within an open-ended hollow tube **254** attached to or integrally formed with the housing **232**. At least a portion of the hollow tube **254** may comprise an optically translucent material (e.g., glass, plastic, rubber, etc.) to allow a user to visualize the sharpened distal end of a biopsy needle disposed therein. The first wing **234** may include a first portion **236** disposed outside the housing **232**, a second portion **238** disposed within the housing **232** and a middle portion **237** extending through an opening **237***a* formed within the housing **232**. A first pin **235** may extend through the middle portion **237** to pivotally attach the first wing **234** to the housing **232**. The second wing **244** may include a first portion **246** disposed outside the housing **232**, a second portion **248** disposed within the housing **232** and a middle portion **247** extending through an opening **247***a* formed within the housing **232**. A second pin **245** may extend through the middle portion **247** to pivotally attach the second wing **244** to the housing **232**.

[0029] The first and second wings **234**, **244** may be configured to pivot about the respective first and second pins **235**, **245** between a first position (FIG. **3**A) and a second position (FIG. **3**B). For example, a user may actuate the first and second wings **234**, **244** between the first and second positions by simultaneously depressing the first portions **236**, **246** extending outside the housing **232**. In the first position when the wings are not depressed, the biopsy needle **170** does not contact the first and second wings **234**, **244**, and is free to move/slide through the needle guard **230**, e.g., as the needle attachment component and needle are withdrawn proximally to position the sharpened distal end **174** of the needle within the hollow tube **254**. In the second position when the wings are depressed, a surface of the first and second wings **234**, **244** may be placed in locked contact with an outer surface, e.g., opposite portions, of the biopsy needle **170**. A force exerted between the opposed first and second wings **234**, **244** may be sufficient to maintain the sharpened

distal end **174** of biopsy needle **170** within the hollow tube **254** for safe removal of the tissue sample, as discussed above.

[0030] In various embodiments, at least a portion of the surface of the respective first and second wings **234**, **244** may include an adhesive material (e.g., glue, adhesive tape), textured pattern (e.g., stippling, grooves, checkering, etc.), magnetic element, etc., which together with the pivot points (e.g., first and second pins **235**, **245**), may be configured to lock the biopsy needle **170** in place when the first and second wings **234**, **244** are engaged and the biopsy needle is proximally retracted. Similarly, in one embodiment, the biopsy needle **170** and first and second wings **234**, **234** may be disengaged (e.g., unlocked) by distally advancing the biopsy needle **170** without necessarily releasing the first and/or second wings **234**, **244** by the user's fingers.

[0031] Referring to FIGS. **4**A-**4**B, in one embodiment, a needle guard **330** of the present disclosure may include a housing **332** comprising a single wing **334** configured to maintain the sharpened distal end **174** of the biopsy needle **170** within an open-ended hollow tube **354** attached to or integrally formed with the housing **332**. At least a portion of the hollow tube **354** may comprise an optically translucent material (e.g., glass, plastic, rubber, etc.) to allow a user to visualize the sharpened distal end of a biopsy needle disposed therein. The single wing **334** may include a first portion **336** disposed outside the housing **332**, a second portion **338** disposed within the housing **332** and a middle portion **337** extending through an opening **337***a* formed within the housing **332**. A pin **335** may extend through the middle portion **337** to pivotally attach the single wing **334** to the housing **332**.

[0032] The single wing **334** may be configured to pivot about the pin **335** between a first position (FIG. **3**A) and a second position (FIG. **3**B). For example, a user may actuate the single wing **334** between the first and second positions by depressing the first portion **336** extending outside the housing **332**. In the first position when the wing is not depressed, the biopsy needle **170** does not contact the single wing **334**, and is free to move/slide through the needle guard **330**, e.g., as the needle attachment component with the needle are withdrawn proximally to position the sharpened distal end **174** of the needle within the hollow tube **354**. In the second position when the wing is depressed, a surface of the single wing **334** may be placed in locked contact with an outer surface of biopsy needle **170**. A force exerted against the outer surface of the biopsy needle by the single wing **334** may be sufficient to maintain the sharpened distal end **174** of biopsy needle **170** within the hollow tube **354** for safe removal of the tissue sample, as discussed above.

[0033] In various embodiments, at least a portion of the surface of the single wing **334** may include an adhesive material (e.g., glue, adhesive tape), textured pattern (e.g., stippling, grooves, checkering, etc.), magnetic element, etc., which together with the pivot point (e.g., pin **335**), may be configured to lock the biopsy needle **170** in place when the single wing **334** is engaged and the biopsy needle is proximally retracted. Similarly, in one embodiment, the biopsy needle **170** and single wing **334** may be disengaged (e.g., unlocked) by distally advancing the biopsy needle **170** without necessarily releasing the single wing **334** by the user's fingers.

[0034] Referring to FIGS. **5**A-**5**B, in one embodiment, a needle guard **430** of the present disclosure may include a knob **440** attached to a threaded rod **442** extending through an opening **437** formed within the housing **432**. The housing may include a gasket to frictionally engage an outer surface of a needle. An inner surface of the opening **437** may include a corresponding grooved surface such that rotating the knob **440** in a first direction (e.g., clockwise) may draw the threaded rod **442** into/toward the housing **432**, and rotating the knob in a second direction (e.g., counterclockwise) may draw the threaded rod **442** away from the housing **432**. The knob **440** may be rotated in the second direction to a second position (FIG. **5**A) in which the biopsy needle does not contact the threaded rod **442**, and is free to move/slide through the needle guard, e.g., as the needle attachment component with the needle are withdrawn proximally to position the sharpened distal end **174** of the needle within the hollow tube **454** attached to or integrally formed with the housing **432**. The knob **440** may be rotated in the first direction to a first position (FIG. **5**B) in which a surface **446** of the threaded rod **442** is placed in contact with an outer surface of the biopsy needle **170** with sufficient force to maintain the sharpened distal end **174** of the biopsy needle **170** within the hollow tube **454** for safe removal of the tissue sample, as discussed above.

[0035] All of the devices and/or methods disclosed and claimed herein can be made and executed without undue experimentation in light of the present disclosure. While the devices and methods of this disclosure have been described in terms of preferred embodiments, it may be apparent to those of skill in the art that variations can be applied to the devices and/or methods and in the steps or in the sequence of steps of the method described herein without departing from the concept, spirit and scope of the disclosure. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope and concept of the disclosure as defined by the appended claims.

What is claimed is:

1. A needle guard, comprising:

a housing;

first and second flexible arms extending distally from a proximal end of the housing;

a gasket disposed within an opening in the housing, a distal end of the first flexible arm includes a first tab, and a distal end of the second flexible arm includes a second tab;

a hollow tube attached to the housing between the first and second flexible arms; and

a needle attachment component comprising a cylinder and a grip,

wherein the first and second flexible arms are configured to move between a first position and a second position,

wherein the first and second flexible arms are configured to extend through an opening formed in a proximal end of a medical device, wherein the first and second tabs contact an inner surface of the medical device when the first and second arms are in the first position and do not contact an inner surface of the medical device when the first and second arms are in the second position, and

wherein an inner surface of the cylinder is configured to frictionally engage an outer surface of the housing, and to allow separation using the force on the first and second flexible arms.

2. The needle guard of claim **1**, wherein the gasket includes an opening configured to slidably receive an outer surface of a needle.

3. The needle guard of claim **2**, wherein the opening of the gasket is configured to frictionally engage the outer surface of the needle.

4. The needle guard of claim **1**, wherein at least a portion of the hollow tube comprises an optically translucent material.

5. A needle guard, comprising:

a housing;

a first wing extending through a first opening in the housing; a second wing extending through a second opening in the housing; and

a hollow tube attached to the housing,

wherein a middle portion of the first wing is pivotally attached to the housing and the first wing is configured to move between a first position and a second position, and

wherein a middle portion of the second wing is pivotally attached to the housing and the second wing is configured to move between a first position and a second position.

6. The needle guard of claim **5**, wherein the housing and hollow tube are configured to receive a needle therethrough.

7. The needle guard of claim **6**, wherein a surface of the first and second wings does not contact an outer surface of the needle when in the first position.

8. The needle guard of claim **7**, wherein the surface of the first and second wings contacts the outer surface of the needle when in the second position.

9. The needle guard of claim **6**, wherein the first and second wings lock a portion of the needle within the housing when in the second position.

10. The needle guard of claim **6**, wherein the a sharpened distal end of the needle is locked within the housing when the first and second wings are in the second position.

11. A needle guard, comprising:

a housing;

a rod including a threaded surface extending through an opening in the housing, an inner surface of the opening including a grooved surface corresponding to the threaded surface; and

a hollow tube attached to a distal end of the housing.

12. The needle guard of claim **11**, wherein the housing and hollow tube are configured to receive a needle therethrough.

13. The needle guard of claim **12**, wherein rotating the rod in a first direction moves an end of the rod toward an interior of the housing, and rotating the rod in a second direction moves the end of the rod away from the interior of the housing.

14. The needle guard of claim **13**, wherein rotating the rod in the first direction places the end of the rod in contact with an outer surface of the needle.

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