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(71) Applicant: **SCIMED LIFE SYSTEMS, INC** [US/US];  
One SCIMED Place, Maple Grove, MN 55411-1566 (US).

(72) Inventors: **DIAMOND, Bruce, H.**; 4 Granite Street,  
Wellesley, MA 02181 (US). **TULLETT, Rodney, C.**;  
6230 - 79th Avenue SE, Mercer Island, WA 98040 (US).

(74) Agent: **TULLETT, Rodney, C.**; Christensen O'Connor  
Johnson Kindness PLLC, Suite 2800, 1420 Fifth Avenue,  
Seattle, WA 98101 (US).

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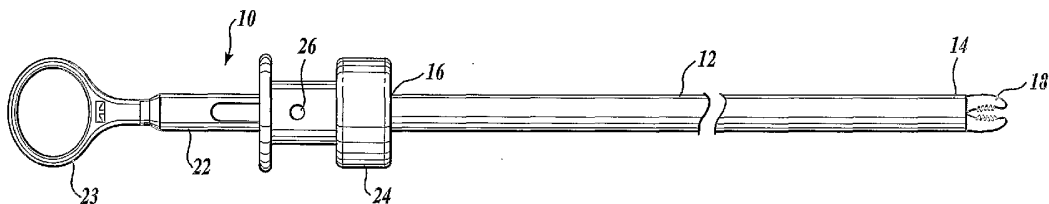
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(54) Title: BIOPSY FORCEPS WITH REMOVABLE JAW SEGMENTS



(57) Abstract: A biopsy forceps has a handle and a pair of tissue cutting jaws that are separated by an elongate sheath. The tissue cutting jaws may be opened and closed to obtain a tissue sample. The tissue cutting jaws are removable from the distal end of the forceps so that a physician can use a different pair of tissue cutting jaws for each sample obtained. Tissue cutting jaws are distributed in trays for easy access by a physician.

## BIOPSY FORCEPS WITH REMOVABLE JAW SEGMENTS

## FIELD OF THE INVENTION

The present invention relates to medical devices in general, and to biopsy forceps  
5 in particular.

## BACKGROUND OF THE INVENTION

A common medical device used with endoscopic procedures is a biopsy forceps. Such a device is an elongate cutter having a handle and a pair of tissue cutting jaws that are separated by a catheter or sheath. The tissue cutting jaws are operated by a cable or  
10 other mechanism that extends through the sheath into the handle. A physician inserts the forceps into a working channel of an endoscope and activates the jaws to obtain a tissue sample for analysis by a pathologist.

In the past, if a physician wanted to biopsy more than one area of tissue, the physician would insert the device into the endoscope, obtain a biopsy sample and retract  
15 the device from the endoscope in order to place the tissue sample in an appropriate container. Alternatively, some biopsy forceps are multiple bite devices that can hold more than one tissue sample. The problem with each type of forceps design is that cross-contamination may occur between different tissue samples thereby providing the physician with an inaccurate assessment of the diseased state of the patient. While it is  
20 possible that the physician could use separate biopsy forceps for each sample, such a solution would require either many disposable devices to be used or could generate many devices that must be sterilized.

Therefore, there is a need for a biopsy forceps that can obtain multiple tissue samples with less likelihood of cross-contamination and that does not require different  
25 devices to be used for each tissue sample.

## SUMMARY OF THE INVENTION

To solve these and other problems, the present invention is a biopsy forceps having removable cutting jaws. The biopsy device has a handle and a pair of cutting jaws separated by a catheter or sheath. A physician manipulates the handle to actuate the  
30 cutting jaws to retrieve a tissue sample. The cutting jaws can be selectively removed after each tissue sample is obtained and a new pair of jaws attached in order to obtain another tissue sample. Sets of cutting jaws can be distributed in a tray or other carrying

device that allows the physician to easily attach a new pair of cutting jaws after each tissue sample is obtained.

### BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same become better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 illustrates a biopsy forceps in accordance with one embodiment of the present invention;

FIGURE 2 illustrates a tray of removable tissue cutting jaws in accordance with an aspect of the present invention;

FIGURE 3 illustrates one embodiment of a mechanism for removably securing a pair of tissue cutting jaws to the distal end of the biopsy forceps;

FIGURE 4 illustrates yet another embodiment of a mechanism for removably securing a pair of tissue cutting jaws to the distal end of a biopsy forceps; and

FIGURE 5 illustrates yet another embodiment of a mechanism for removably securing a pair of tissue cutting jaws to the distal end of a biopsy forceps.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIGURE 1, a biopsy forceps 10 in accordance with one embodiment of the present invention includes a catheter or sheath 12 having a distal end 14 and a proximal end 16. At the distal end 14 of the sheath 12 is a pair of tissue cutting jaws 18. The tissue cutting jaws 18 are removably secured to the biopsy forceps such that the jaws 18 can be exchanged for another pair of jaws after a tissue sample is obtained. A handle 20 at the proximal end of the sheath includes a stationary portion 22 having a thumb ring 23 and a slide 24 that moves with respect to the stationary portion 22 of the handle. The physician moves the slide 24 to open and close the tissue cutting jaws 18 and obtain a tissue sample.

After a tissue sample has been retrieved, the physician can disengage the tissue cutting jaws 18 from the distal end 14 of the biopsy forceps 10 and a new pair of cutting jaws can be secured thereto in order to obtain another tissue sample.

FIGURE 2 shows a number of removable tissue cutting jaws 18a, 18b, 18c . . . 18o within a tray 30. The physician can obtain a tissue sample with each pair of tissue cutting jaws and deposit the jaws with the tissue sample attached back into the

tray 30 so that the tray can be forwarded to a pathologist or other analysis center for review and/or diagnosis. Once all the desired tissue samples have been obtained, the biopsy forceps 10 can be either disposed of, or depending upon the materials used to manufacture the biopsy forceps, the handle and sheath portion of the forceps can be  
5 sterilized for use with another patient. As will be appreciated, it is not necessary that the tissue samples remain in the tissue cutting jaws after they are obtained. Such samples could be placed in conventional specimen jars.

FIGURE 3 illustrates a mechanism for removably securing a pair of tissue cutting jaws to the distal end of a biopsy forceps in accordance with one embodiment of the  
10 present invention. In this embodiment, the sheath 12 includes an inner elongate member 40 and an outer sleeve 42 that slides over the inner elongate member 40. The distal end of the inner elongate member 40 has a notch 44 that cooperates with a notch 46 at the proximal end of a pair of tissue cutting jaws 18. In this embodiment, the interlocking notches join the cutting jaws 18 to the distal end of the inner elongate  
15 member 40. The outer sleeve 42 slides over the interlocking notches in order to maintain their position within the outer sleeve 42. Thus, while the outer sleeve 42 is positioned over the joint between the interlocking notches, the cutting jaws 18 are secured to the distal end of the biopsy forceps. In one embodiment of the invention, the tissue cutting jaws 18 are biased radially outward such that upon movement of the outer sleeve 42 in  
20 the distal direction, the jaws are urged into a closed position. Upon retraction of the outer sleeve 42, the jaws are allowed to open to retrieve a tissue sample. Upon further retraction of the outer sleeve 42, the joint between the interlocking notches is uncovered and the distal end of the inner elongate member 40 can be removed from the proximal end of the tissue cutting jaws 18.

25 In the embodiment shown in FIGURE 3, the inner elongate member 40 is preferably connected to the stationary handle 22 while the outer sleeve 42 is preferably connected to the movable slide 24 such that the physician can control the opening and closing of the jaws as well as the removal of the cutting jaws 18 with one hand. A button 26 (shown in FIGURE 1) may be provided to limit the movement of the slide 24.  
30 The position of the button 26 allows the outer sleeve 42 to be moved past the joint between the interlocking notches in order to exchange the tissue cutting jaws 18.

FIGURE 4 shows an alternative embodiment of a mechanism for releasably securing a pair of tissue cutting jaws 18 to the distal end of the biopsy forceps. In this

embodiment, the biopsy forceps includes an inner elongate member 60 and an outer sleeve 62. Within the inner elongate member 60 is a spring loaded actuating cable 64 having a cylinder 66 disposed at its distal end. The cylinder 66 includes one or more slots 68 in which radially extending pins 70 ride. The pins 70 extend radially outwards  
5 from the cylinder such that they extend through the side of the inner elongate member 60 and into corresponding holes 72 on a pair of tissue cutting jaws in order to secure the jaws to the forceps. Movement of the cylinder 66 by the cable 64 causes the pins 70 to move radially inwards and outwards. With the pins 70 in the radially outward position, they engage corresponding holes 72 on the proximal end of the tissue cutting jaws 18.  
10 When the cable 64 is moved in the proximal direction, the ends of the pins move in the slots 68 to pull the pins 70 radially inwards, thereby releasing the tissue cutting jaws 18 from the forceps so that a new pair of cutting jaws can be installed.

FIGURE 5 illustrates yet another mechanism for removably securing a pair of tissue cutting jaws 18 to the distal end of the biopsy forceps. In this embodiment, the  
15 biopsy forceps has an inner elongate member 80 and an outer sleeve 82. At the distal end of the inner elongate member 80 are one or more spring loaded balls 84 that engage a race or other indentation on the inner surface of the proximal end of the tissue cutting jaws 18. By compression of a ball 84 and its subsequent release within the race or indentation, the tissue cutting jaws 18 are held in a friction fit at the distal end of the  
20 biopsy forceps. The outer sleeve 82 is movable over the jaws in order to open and close them as with the embodiments shown in FIGURES 3 and 4. The tissue cutting jaws 18 can simply be pulled off a distal end of the inner elongate member 80 and a new pair of jaws installed by forcing the distal end of the inner elongate member 80 into the proximal end of another set of jaws.

25 While the preferred embodiment of the invention has been illustrated and described, it will be appreciated that various changes can be made therein without departing from the scope of the invention. Therefore, it is intended that the scope of the invention is to be determined from the following claims and equivalents thereof.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A biopsy forceps, comprising:  
a handle at the proximal end of the forceps;  
an elongate sheath secured to the handle; and  
a plurality of tissue cutting jaws removably securable to a distal end of the elongate sheath, said tissue cutting jaws being operable to obtain a tissue sample.
2. The biopsy forceps of Claim 1, wherein the plurality of tissue cutting jaws are packaged in a tray.
3. A biopsy forceps for obtaining tissue samples, comprising:  
a handle at the proximal end of the forceps;  
an elongate sheath secured to the handle;  
a plurality of disposable tissue cutting jaws that are removably secured to a distal end of the elongate sheath; and  
a mechanism for selectively releasing a pair of tissue cutting jaws from the elongate sheath such that a new pair of tissue cutting jaws can be secured to the forceps for each tissue sample obtained.
4. The biopsy forceps of Claim 3, wherein the tissue cutting jaws are biased radially outwards and the sheath has an outer sleeve that is movable over the jaws to close the tissue cutting jaws.
5. The biopsy forceps of Claim 4, wherein the mechanism releases the tissue cutting jaws by movement of the outer sleeve with respect to the tissue cutting jaws.
6. The biopsy forceps of Claim 3, wherein the sleeve includes a cable and the mechanism for releasing the tissue cutting jaws is activated by the cable.
7. The biopsy forceps of Claim 3, wherein the sheath has at least one spring loaded pin at its distal end that engages a pair of tissue cutting jaws to secure the jaws to the forceps.

8. A disposable device for obtaining a tissue sample through an endoscope, comprising:

a pair of opposing jaws that are movable between an open position and a closed position to obtain a tissue sample; and

a connector that selectively engages a distal end of a biopsy forceps such that the jaws can be removed from the forceps after a tissue sample is obtained.

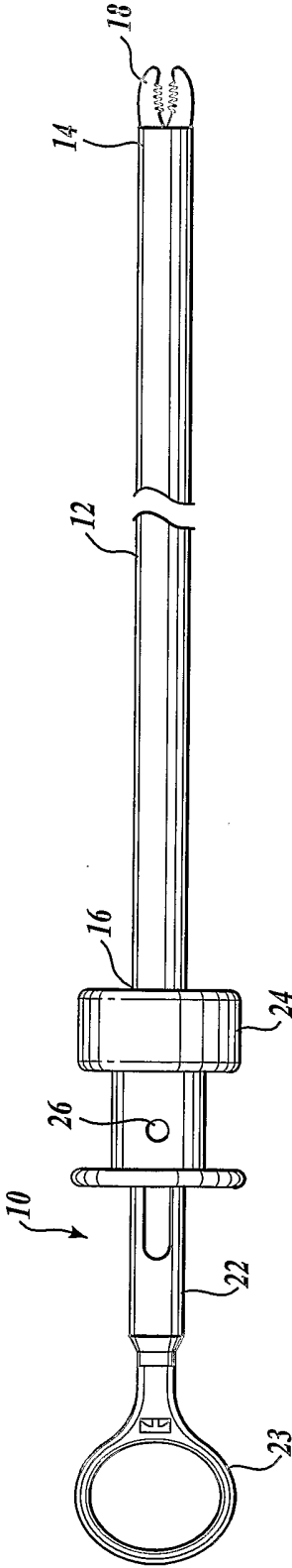


Fig. 1.

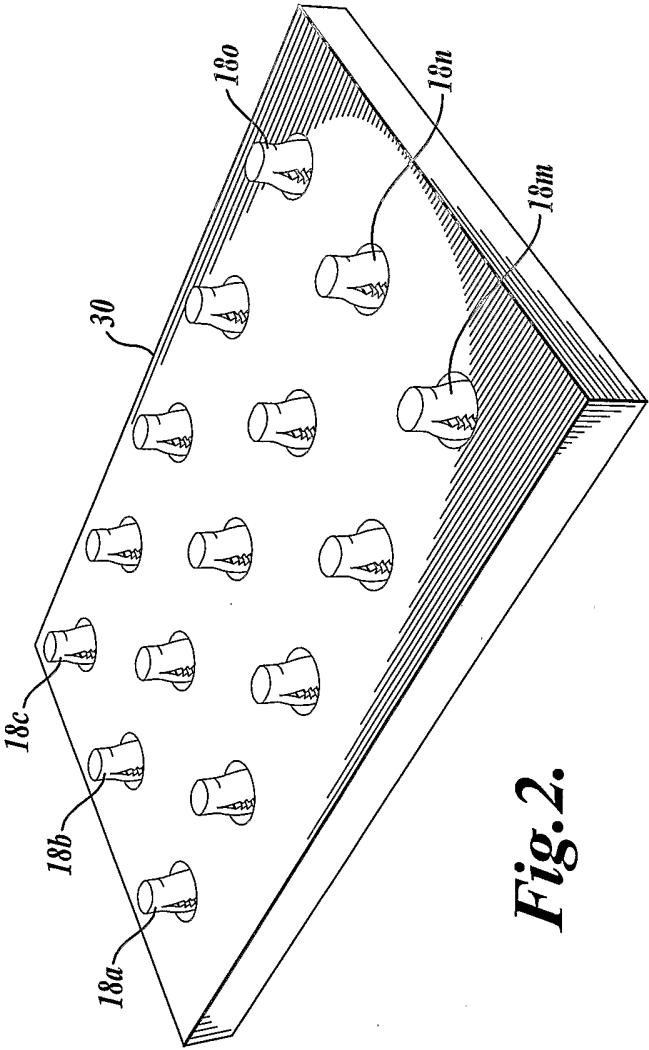


Fig. 2.

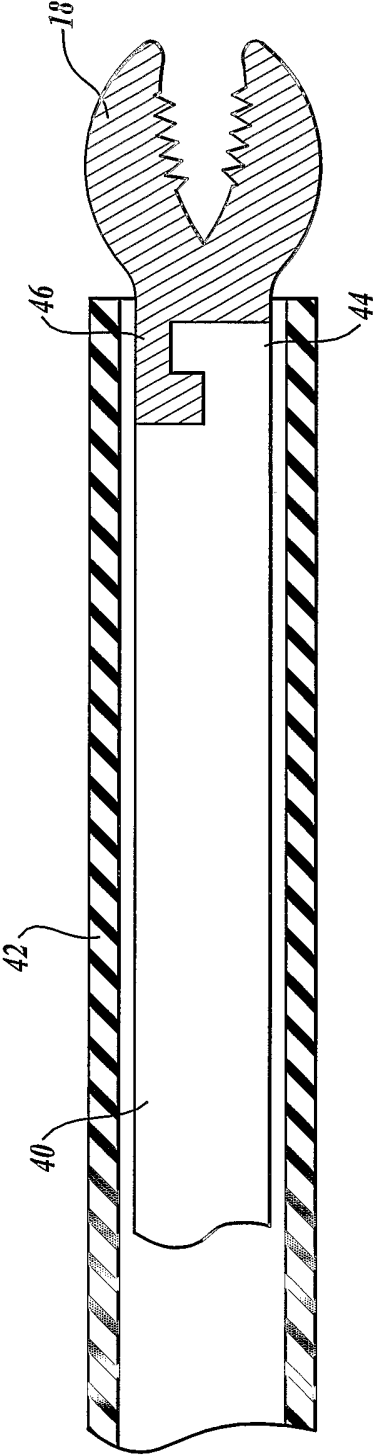


Fig. 3.

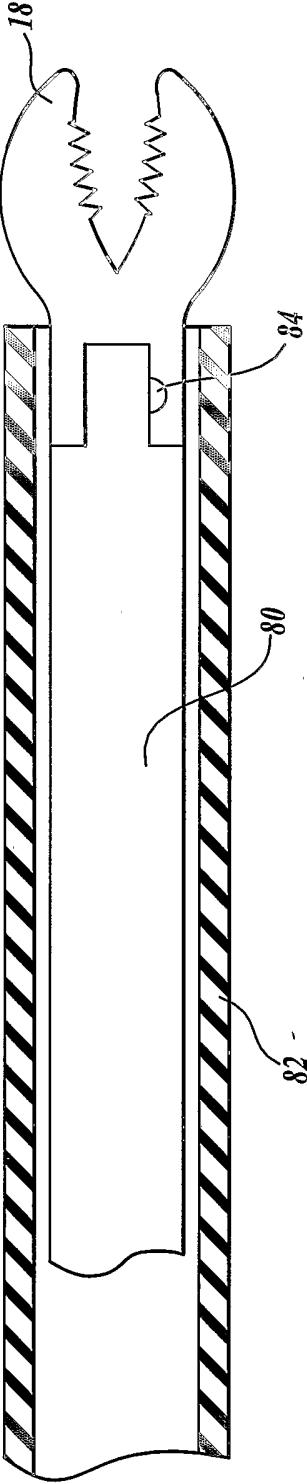
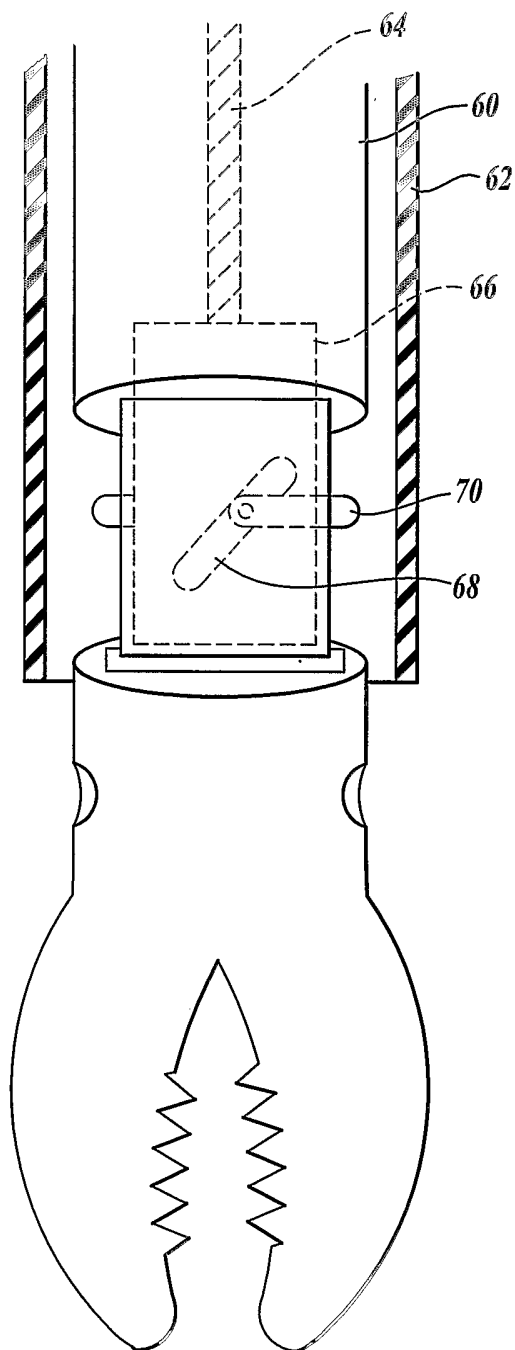


Fig. 5.

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***Fig. 4.***

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 A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 A61B1/00 A61B10/00 A61B17/28

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## B. FIELDS SEARCHED

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, BIOSIS

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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