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(54) **SURGICAL SUTURING APPARATUS WITH MEASUREMENT STRUCTURE**

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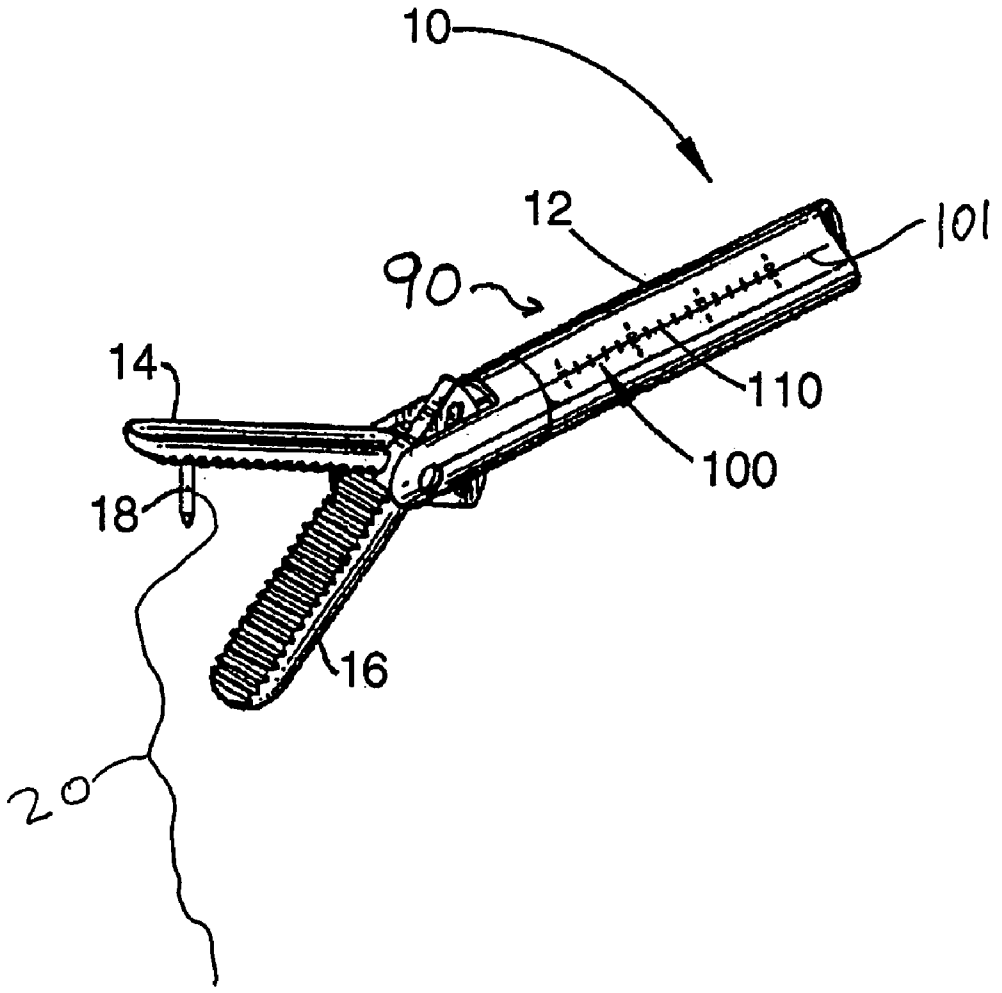
(57) **ABSTRACT**

There is disclosed suture manipulating instrumentation having measuring structure to determine the length of suture during a given point in a surgery. The instrument is preferably a surgical suturing instrument capable of manipulating a suture carrying needle at the distal end. The measuring structure in the form of a scale is provided on the suturing instrument at a location remote from the distal end. The length of suture can easily be determined with the use of the scale at any point during a surgery. There is also disclosed a kit for providing the suture measuring structure on other suture manipulating instruments, as well as, methods of using suture manipulating instrumentation having the disclosed measuring structure.



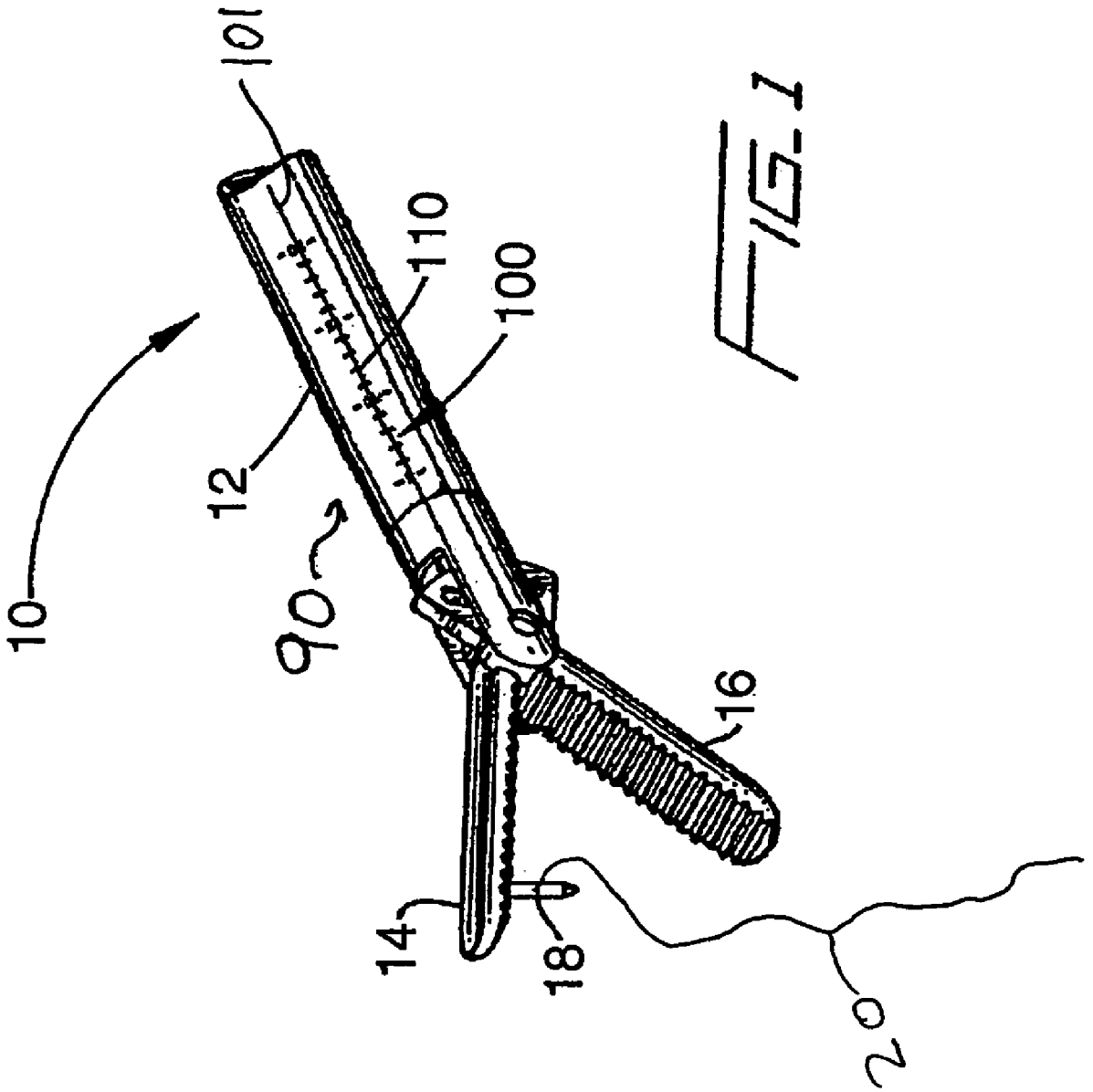


FIG. 1

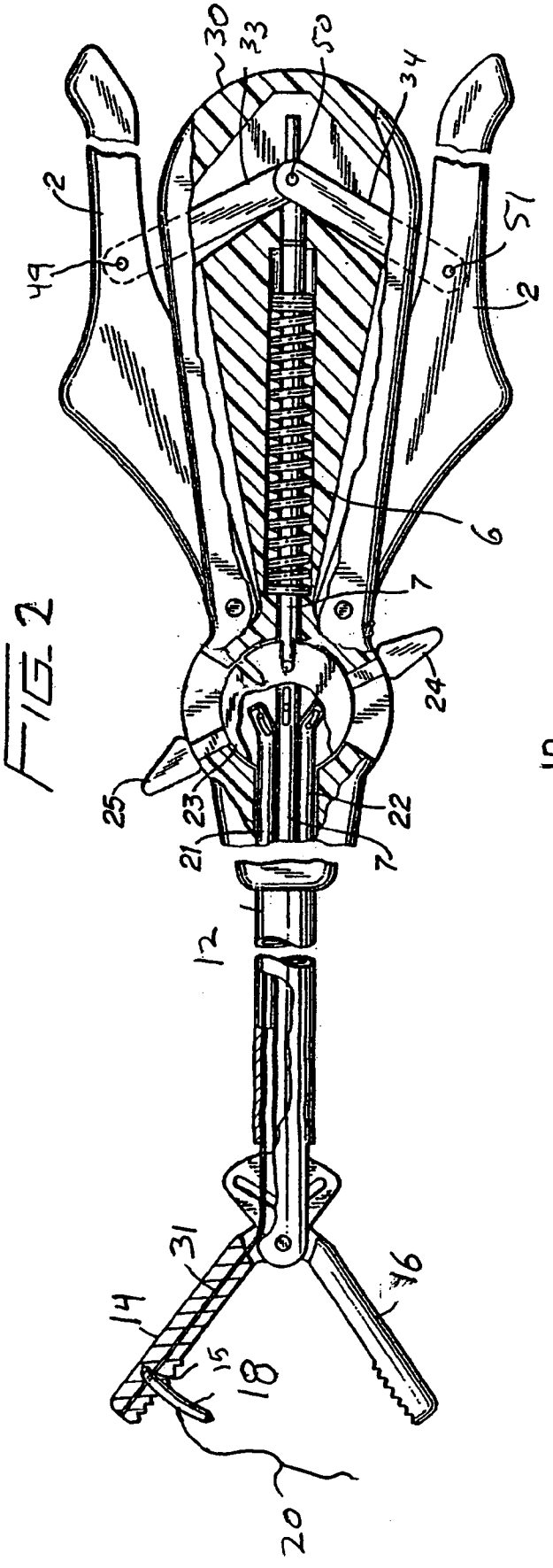


FIG. 2

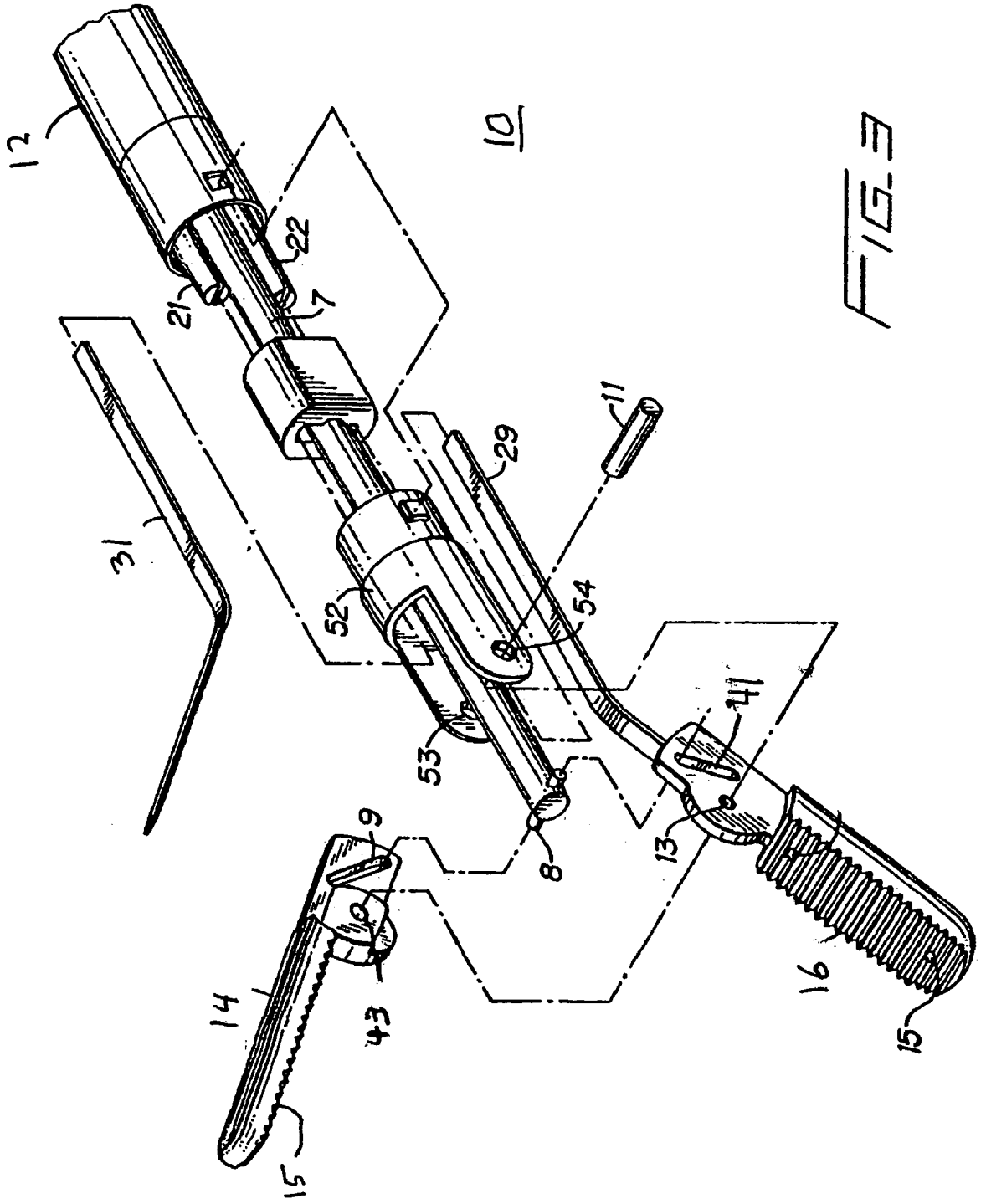


FIG. 3

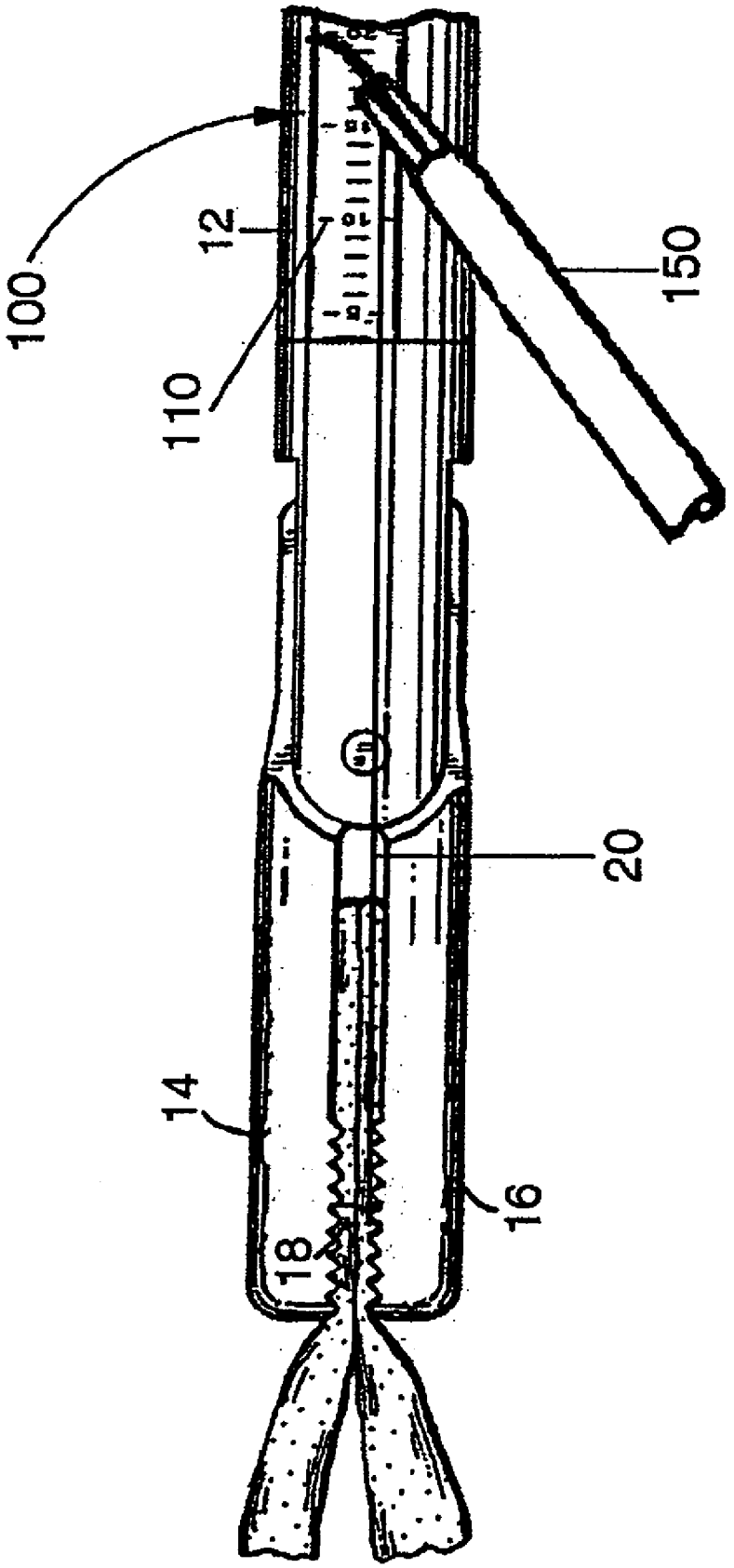


FIG. 4

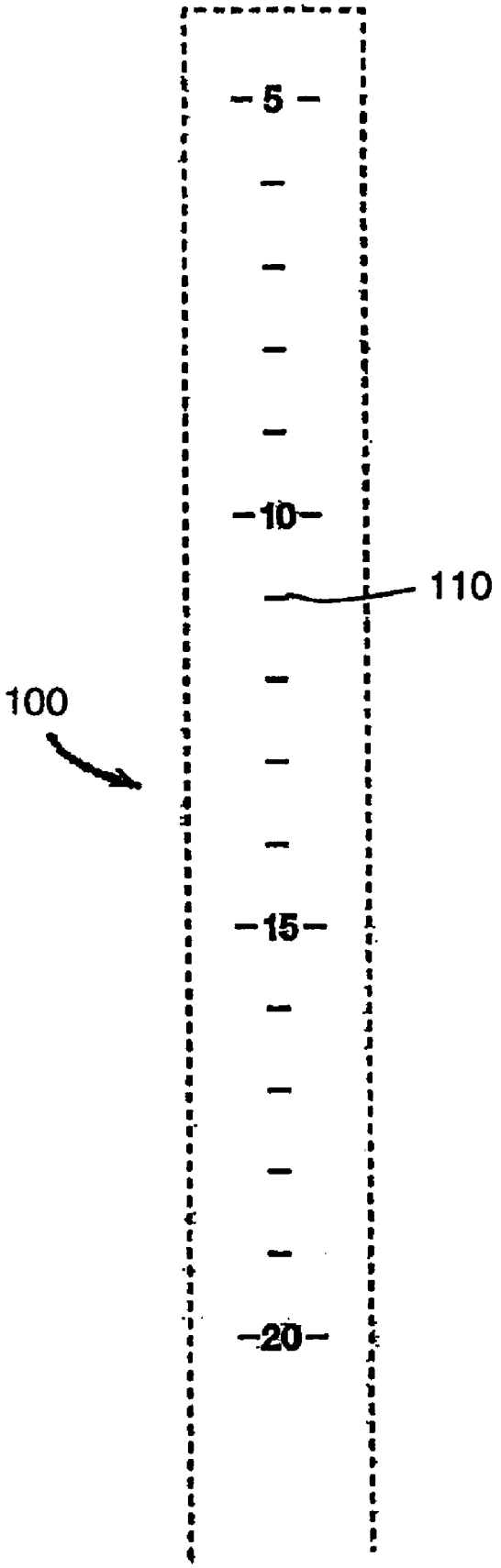


FIG. 5

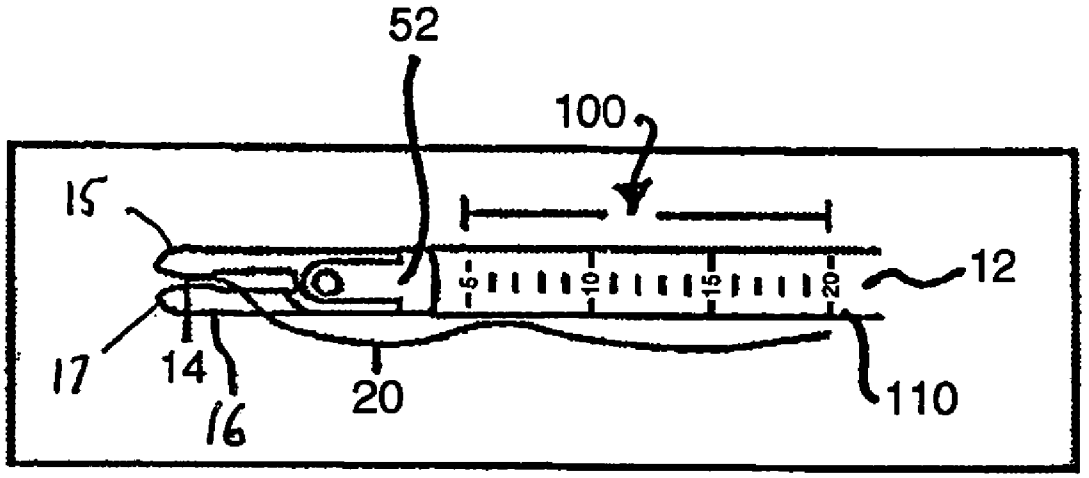


FIG. 6

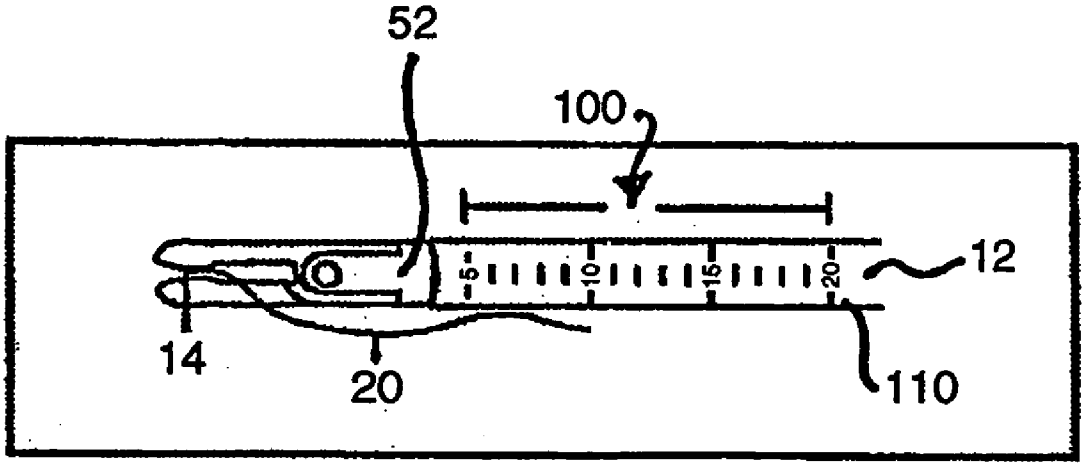


FIG. 7

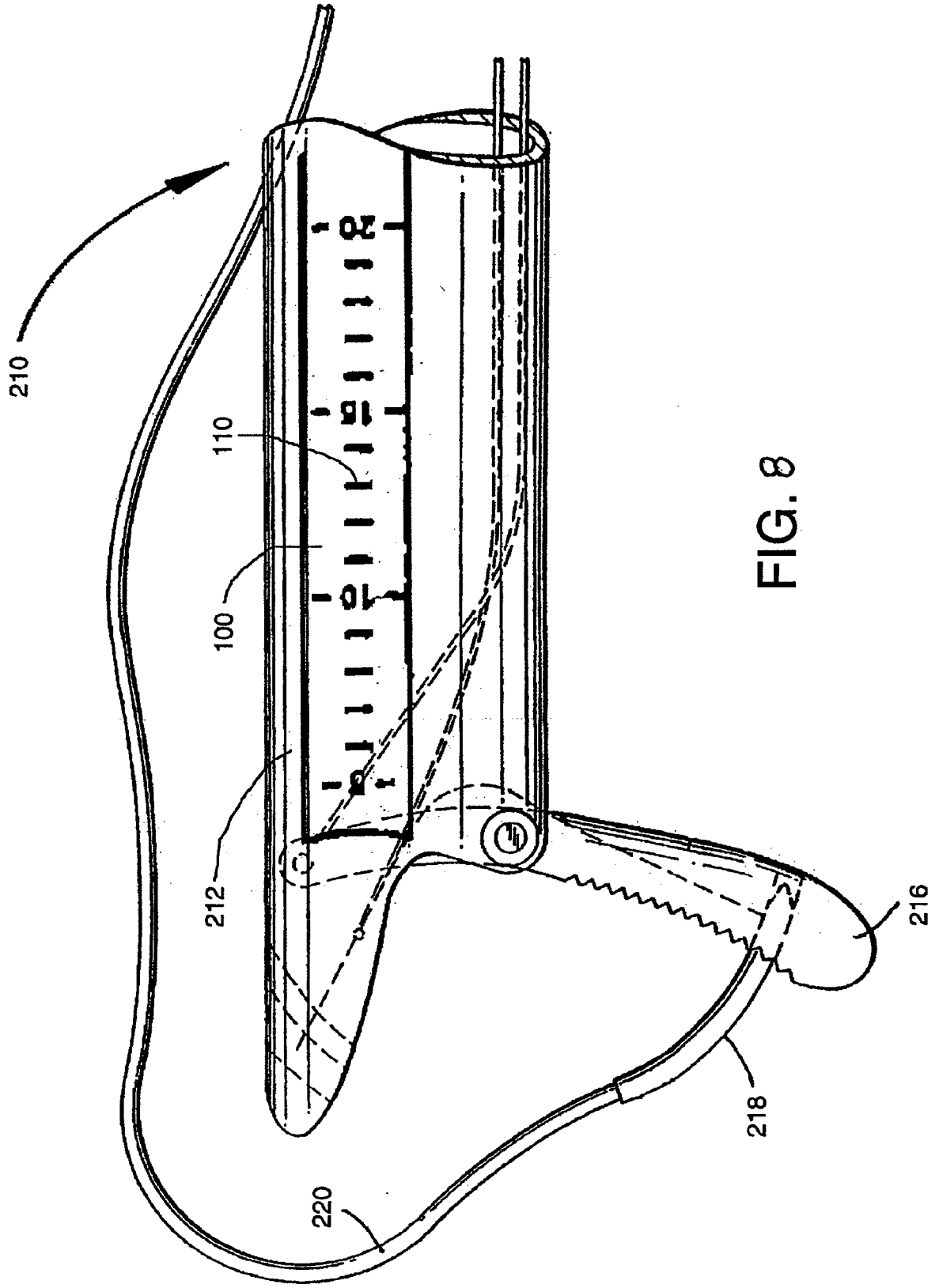


FIG. 8

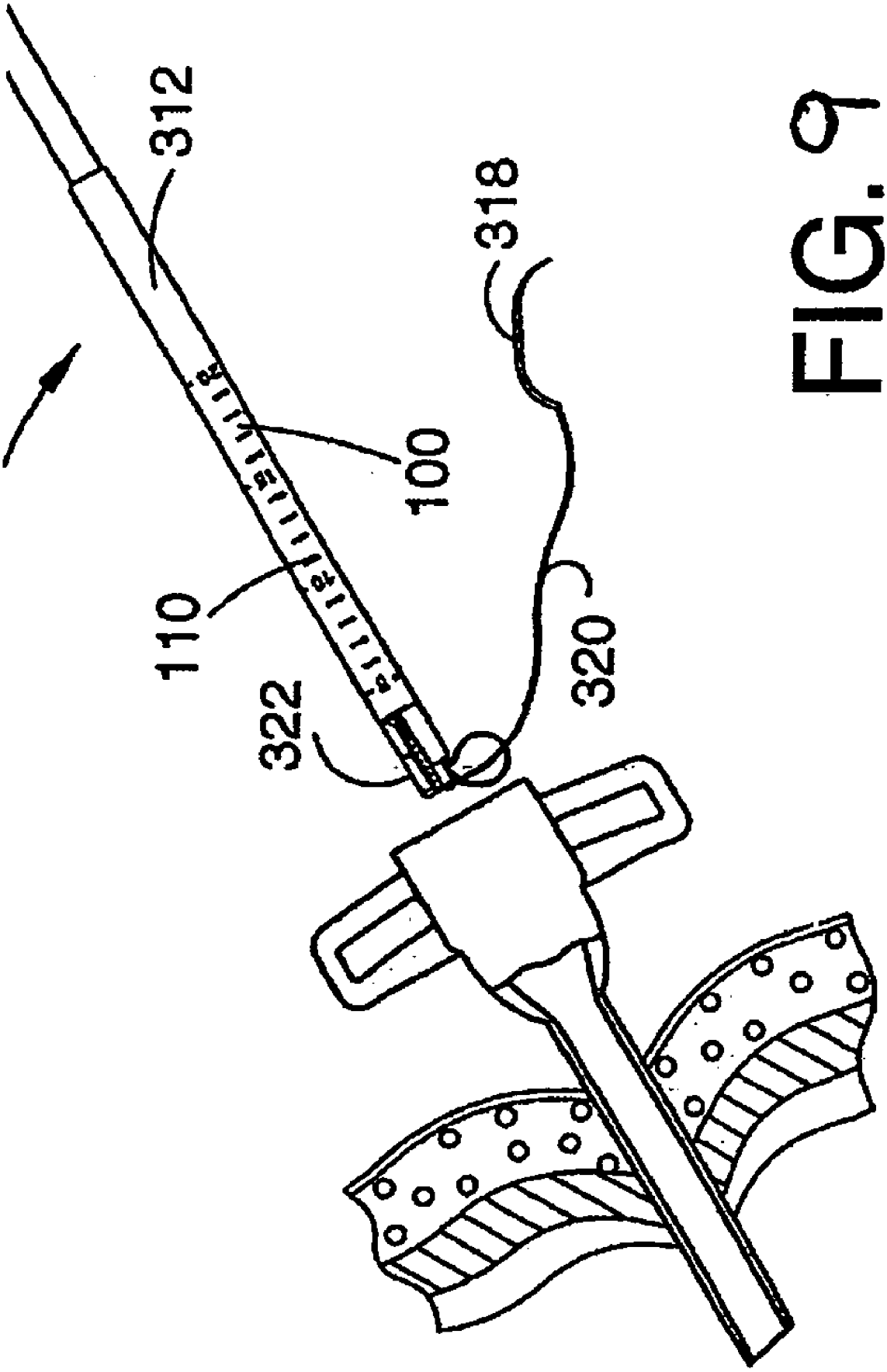


FIG. 9

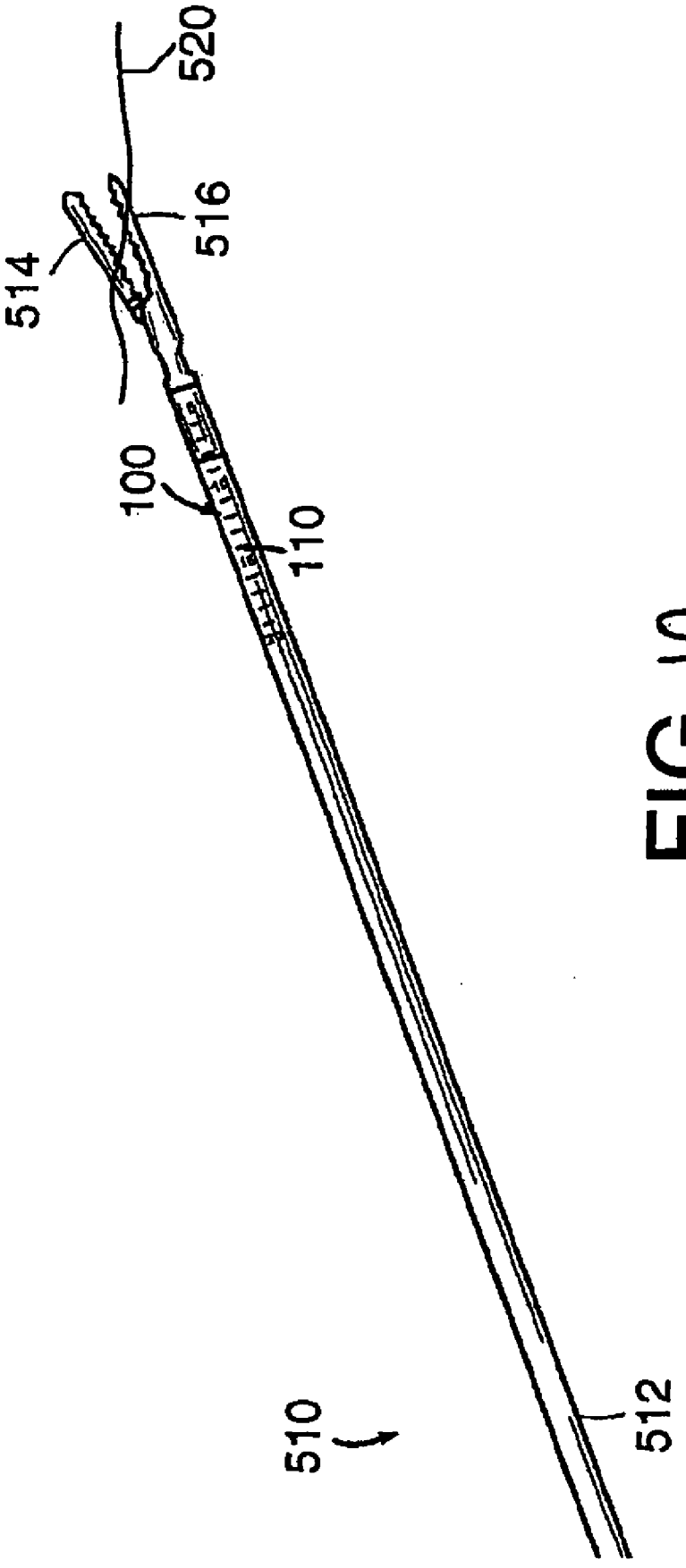


FIG. 10

SURGICAL SUTURING APPARATUS WITH MEASUREMENT STRUCTURE

CROSS REFERENCE TO RELATED APPLICATION

[0001] The present disclosure claims priority to U.S. provisional application Ser. No. 60/416,058, filed Oct. 4, 2002, entitled Surgical Suturing Apparatus With Measurement Structure, the entire disclosure of which is incorporated by reference herein.

BACKGROUND

[0002] 1. Technical Field

[0003] The present disclosure relates generally to surgical instrumentation and, more particularly, to surgical instrumentation having measuring apparatus for use in endoscopic or laparoscopic surgical procedures.

[0004] 2. Description of Related Art

[0005] Endoscopic procedures are typically performed through an elongated cannula structure having a relatively small diameter with a proximal and distal end. In laparoscopic surgery an incision is made in the abdominal wall and the distal end of the cannula is passed through the tissue into the body cavity wherein the surgical procedure or examination is to be effected, thus providing a conduit for the insertion of surgical instrumentation. A plurality of cannula structures may be used to allow operation of a variety of instruments simultaneously during a given procedure. For example, one cannula may provide a conduit for an endoscope for vision and illumination within the operative cavity while the other cannulas may provide conduits for control of specialized surgical instruments designed for performing specific procedural functions.

[0006] Many surgical procedures call for suturing tissue, a procedure traditionally accomplished by hand, or by passing a needle between forceps. Laparoscopic suturing presents a particularly challenging task, because it must be accomplished using instrumentation extended through a port that typically has an internal diameter that averages between five and twelve millimeters. Instruments for facilitating laparoscopic suturing are disclosed in U.S. Pat. No. 5,478,344, issued Dec. 26, 1995, to Stone et al., which is incorporated herein in its entirety by reference. The Stone et al. patent discloses in certain embodiments, a surgical suturing apparatus capable of passing control of a surgical needle, having a length of suture attached thereto, back and forth between its jaws to repeatedly pass the surgical needle and suture through tissue to suture tissue. In addition, it discloses methods of using the apparatus to suture tissue.

[0007] Other laparoscopic suturing instruments are also available in the marketplace. For example, U.S. Pat. No. 5,690,653, issued Nov. 25, 1997, to Richardson et al. discloses in certain embodiments a suturing device that includes an elongated tubular shaft having a needle disposed at the distal end. The needle is attached to a suture and is passed between one or more relatively movable jaws, as well as a method of using the device.

[0008] However, while the above-mentioned devices are valuable for laparoscopic suturing, none of the above-mentioned devices includes structure or discloses a method that facilitates measurement of the length of suture material while the device is in the body cavity. Therefore, a need exists for a suturing apparatus that maintains the advantages of laparoscopic suturing and incorporates a suture material measurement structure.

SUMMARY

[0009] Various measuring structures are provided for use with a number of different laparoscopic surgical instruments. The measuring structures are disposed on the apparatus for determining the length of a suture or determining the amount of suture material remaining when using the apparatus. Preferably, the measuring structure is an integral part of the laparoscopic instrument and is disposed at the distal end of the instrument for accurate measurement of the suture. Alternatively, by measuring structure is included in a kit that can be used with a number of different laparoscopic instruments. In either embodiment, the measuring structure has a number of graduations showing the selected units of measure. Further still, the measuring structure can be positioned such that the graduations are only visible from one vantage point. However, in a preferred embodiment, the measuring structure will be disposed so that it covers the outer perimeter of the surgical instrument substantially in its entirety. In this embodiment, the graduations of the measuring structure will be visible to the surgeon from most any vantage point enabling the surgeon to obtain a measurement without undue manipulation of the laparoscopic instrument.

[0010] Specifically a surgical instrument for manipulating a suture is disclosed including an elongate member having a distal end configured to manipulate a suture and a scale on at least a part of the elongate member and adjacent the distal end. The scale has at least one graduation and preferably a plurality of graduations to measure suture lengths. A predetermined point is identified on the elongate member such that the scale indicates the distance from the predetermined point to the at least one graduation. Preferably, the elongate member includes at least one jaw and the predetermined point is disposed on the the jaw. The jaw is configured to retain a needle carrying a suture and, alternatively, the predetermined point is located on the needle.

[0011] The surgical instrument is preferably a suturing apparatus and predetermined point is located at the point of connection between the suture and the needle. The point of connection can be at one end of the needle, but preferably is located between the ends of the needle, especially with a double pointed needle.

[0012] The surgical instrument has at least one jaw is movable relative to the elongate member such that the distance from the predetermined point and the scale is calibrated with the at least movable jaw in a predetermined position. In a preferred embodiment of the surgical instrument the elongate member includes two movable jaws which are configured to repeatedly pass control of a needle carrying a suture therebetween and through tissue to form stitches.

[0013] The scale is provided to measure the remaining amount of suture after suturing and includes a plurality of graduations. Preferably, the scale is provided on a material affixed to the elongate member such as a shrink wrap affixed to the elongate member. Alternatively, the scale can be located on at least one longitudinally extending strip of

material or etched into the elongate member. Preferably, the graduations indicate the distance in centimeters.

[0014] There is also disclosed a kit to assist manipulation of a suture with an elongate instrument including a scale configured to be attached to the distal end of a suture manipulating instrument and a template to calibrate the position of the scale relative the predetermined point on the distal end of the instrument. Preferably, the scale is provided on a shrink wrap material.

[0015] There is further disclosed a method of manipulating a suture by providing an elongate suture manipulating instrument configured to hold a first end of a suture at a predetermined point on a distal end of the instrument and a scale having at least one graduation provided on the instrument at a location remote from the distal end. During surgery a second end of the suture is grasped with a separate device and drawn along the instrument adjacent the scale so that a second end of the suture is adjacent the graduations on the scale to measure the length of suture. The drawing of the suture can be performed while the suture is being passed through tissue or after the suture is passed through tissue.

[0016] These together with other advantages will become apparent from the details of construction and operation as more fully hereinafter described.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Various embodiments are disclosed herein with reference to the drawings wherein;

[0018] **FIG. 1** is a perspective view of the distal end of a surgical suturing apparatus in accordance with an embodiment of the present disclosure, showing a measuring structure;

[0019] **FIG. 2** is a side plan view, partially shown in section, of the suturing apparatus in accordance with the embodiment of **FIG. 1**;

[0020] **FIG. 3** is a exploded perspective view of the distal end of a surgical suturing apparatus in accordance with the embodiments of **FIGS. 1 and 2**;

[0021] **FIG. 4** is a side view of the distal end of the suturing apparatus in accordance with the embodiment of **FIGS. 1-3**, showing a grasping instrument holding the suture along the measuring structure;

[0022] **FIG. 5** is a plan view of a measuring structure in accordance with the embodiment of **FIGS. 1-4**;

[0023] **FIG. 6** is a side view of the distal end of the suturing apparatus in accordance with the embodiment of **FIGS. 1-5**, illustrating the measuring structure measuring a length of suture material;

[0024] **FIG. 7** is a side view of the distal end of the tubular housing in accordance with the embodiment of **FIG. 1-6**, illustrating the measuring structure measuring a different length of suture material;

[0025] **FIG. 8** is a perspective view of the distal end of a surgical suturing apparatus in accordance with a further embodiment of the present disclosure;

[0026] **FIG. 9** is a perspective view of the distal end of a surgical apparatus in accordance with another embodiment of the present disclosure; and

[0027] **FIG. 10** is a perspective view of a surgical grasping instrument in accordance with another embodiment of the present disclosure.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0028] The embodiments disclosed herein below relate to surgical instruments for manipulating a suture and having measuring structure to measure a length of suture at any time during a surgery.

[0029] **FIGS. 1-7**, show an embodiment of a suturing apparatus in accordance with an embodiment of the present disclosure. Suturing apparatus, generally indicated by reference numeral **10**, has an elongated tubular housing or body portion **12**, and two movable jaws (or jaw elements) **14** and **16**. A needle **18** is releasably retained in one of jaws **14** and **16** at the distal end of suturing apparatus **10**. Suturing apparatus **10** is configured to pass needle **18** back and forth between jaws **14** and **16**. A length of suture **20** is connected to needle **18** such that passing needle **18** back and forth between tissue passes suture **20** through the tissue to form stitches. A measuring structure **90** is disposed on the distal portion of tubular housing **12** to measure the length of suture **20**. As is conventional, the term "distal" refers to that direction further from the user while the term "proximal" refers to that direction closer to the user.

[0030] Referring to **FIGS. 2 and 3**, there is shown suturing apparatus **10** in greater detail. Suturing apparatus **10** is described in certain embodiments of U.S. Pat. No. 5,690,653, the disclosure of which is hereby incorporated by reference herein. Suturing apparatus **10** has a handle housing **30** with a two-armed handle **2**, elongated tubular housing **12**, and two jaws **14** and **16**. Handle **2** is used to control the opening and closing of jaws **14** and **16**. Handles **2** are connected to a rod **7** by a pair of links **33** and **34** and pins **49**,**50** and **51**. Center rod **7** is spring biased distally by spring **6**. Spring **6** fits around center rod **7** and rests in a channel of housing **30**. When the handles **2** are squeezed, center rod **7** moves backward (proximally), causing spring **6** to be compressed. Referring to **FIG. 3**., the distal end of center rod **7** has a pin **8** which rides in a cam slots **9** and **41** in each of the jaws **14** and **16**. Jaws **14** and **16** are pivotally connected to each other by pin **11** extending through holes **43** and **13** and through holes **53** and **54** of support **52**. When center rod **7** is pulled proximally through actuation of the handles **2**, pin **8** is also pulled proximally in cam slots **9** and **41**, camming jaws **14** and **16** closed.

[0031] Each jaw **14** and **16** is adapted to receive needle **18** in recess **15**. When jaws **14** and **16** are closed needle **18** sits in recesses **15** in both jaws **14** and **16**. When jaws **14** and **16** are opened, needle **18** is retained in one or the other recesses **15** depending on which blade **31** or **29** intersects needle **18** through recess **15**. Blade **31** cooperating with upper jaw **14** extends into recess **15** to secure needle **18**. Alternatively, blade **29** may intersect needle **18** through recess **15**, securing needle **18** in jaw **16**. The movement of blades **31** and **29** to engage needle **18** will now be described.

[0032] On either side of center rod **7** are side rods **21** and **22** which sit inside tubular housing **12** and are connected at their proximal ends to a wheel **23** movably housed inside handle housing **30**. Wheel **23** has two arms **24** and **25** projecting from either side that allow the operator of the

apparatus to turn wheel **23**. To transfer needle **18** from jaw **14** to jaw **16**, the jaws are closed and wheel **23** is rotated by turning side arm **25** clockwise so that side rod **21** is pulled proximally and side rod **22** is pushed distally. Side rods **21** and **22** are connected to blades **31** and **29**, respectively. Therefore, when side rod **22** is pushed distally, blade **29** is pushed distallly and engages needle **18** by extending into recess **15** to secure needle **18** in jaw **16**. While blade **29** is in a distal position, blade **31** is in a retracted or proximal position, as each blade is connected to wheel **23** through a respective rod. Thus blade **31** does not contact needle **18**, thereby allowing release of the needle **18** from jaw **14**. Similarly, side arm **24** may be turned counterclockwise, sliding side rod **21** and blade **31** distally and side arm **25** and blade **29** proximally, thereby securing needle in jaw **14** and allowing release of needle **18** from jaw **16**.

[**0033**] Referring to **FIGS. 1 and 4-7** measuring structure **90** has a scale **100** preferably disposed along a portion of tubular housing **12** such that scale **100** is adjacent to the distal end and extends longitudinally along tubular housing **12**. Scale **100** has a longitudinal axis **101** that extends in the same direction as the longitudinal axis of body portion **120**. A plurality of graduations **110** are disposed on scale **100** and are uniformly spaced apart along longitudinal axis **101** of scale **100**. Graduations **110** indicate the distance from a predetermined point on the distal end of suturing apparatus **10**. Preferably, the predetermined point is the point of connection between suture **20** and needle **18** to give an accurate measurement of the remaining usable length of suture **20**. Since at least one of jaws **14** and **16** are movable, scale **100** must be calibrated with the jaw holding needle **18** in a predetermined position. This predetermined position may be fully open, fully closed or some predetermined position in between. Otherwise, movement of the jaw holding needle **18** will affect the measurement reading.

[**0034**] Graduations **110** may be marked with Arabic numerals, Roman numerals, Greek letters, or other suitable symbols of indicia. Preferably, graduations **110** are marked with Arabic numerals so that the units of measure are readily ascertainable. Although graduations **110** are shown in centimeters, the actual units of measure may be changed to suit the user's needs without departing from the scope of the disclosure (e.g. inches, millimeters, decimeters, etc.).

[**0035**] As shown in **FIGS. 1 and 4**, graduations **110** on scale **100** generally in the same viewing plane as needle **18**. Placing needle **18** and graduations **110** in the same viewing plane allows the surgeon using suturing apparatus **10** to observe scale **100**, needle **18** and a suture **20** simultaneously. However, during endoscopic surgery, the surgeon's field of view is limited by the endoscope, and suture **20** may not lie in the field of view of the endoscope. It is preferred that graduations **110** be visible to the surgeon regardless of the physical orientation of the surgical instrument. Therefore, the lateral dimensions of scale **100** and graduations **110** are such that graduations **110** cover a large enough area on tubular housing **12** so that graduations **110** are visible to the surgeon regardless of the orientation of the surgical instrument. Scale **100** and graduations **110** may cover the full perimeter of body portion **12** or only a part thereof.

[**0036**] Extending scale **100** and graduations **110** along a greater portion of the surface of regular housing **12** does not alter the accuracy of the instrument since graduations **110** are still uniformly spaced apart, but allows graduations **110** to be visible in more than one plane of view. For example, graduations **110** may encompass approximately up to 90 degrees of the surface of tubular housing **12** as shown in **FIG. 1**. In addition, more than one scale may be disposed on a surgical instrument such as disposing a number of scales around the surface of tubular housing **12**. When a number of scales are disposed in this fashion, the scales may be contiguous or may be transversely spaced apart. Preferably, graduations **110** will extend circumferentially about tubular housing **12** up to and including 360 degrees of the surface.

[**0037**] Scale **100** and graduations **110** are shown in the figures as being disposed on tubular surgical instruments for illustrative purposes only. It is within the scope of this disclosure for scale **100** and graduations **110** to be disposed on instruments that have regular or irregular polygonal shapes. With instruments that have regular or irregular polygonal shapes, graduations **110** may be disposed on one or more surfaces of the polygon, alternating surfaces of the polygon or all surfaces of the polygon depending on the particular instrument and its application.

[**0038**] A more detailed view of scale **100** with graduations **110** is shown in **FIG. 5**. Although scale **100** is shown having a range of 5-20 units, preferably centimeters, other units and ranges are entirely within the scope of the present disclosure. The selected range of scale **100** and units of graduations **110** are determined by the user's requirements. In the present example of 5-20 centimeters, scale **100** has an accuracy of ±0.6 centimeters. In this figure, the scale **100** uses one (1) unit graduations commencing with the numeral five (5). It is within the scope of the disclosure that scale **100** could be designed to include graduations **110** representing less than one (1) unit (i.e. ½ unit) or units greater than one (1) unit (e.g. 1½, 2, or 5). The number of units represented by each graduation **110** is not limited to what is disclosed here, but is to be determined by the ultimate application of the scale **100**. In addition, graduations **110** are illustrated in centimeters, the actual units of measure may be changed to suit the user's needs without departing from the scope of the disclosure (e.g. inches, millimeters, decimeters, etc.).

[**0039**] **FIGS. 6 and 7** depict the distal end of tubular housing **12** of suturing apparatus **10**. Scale **100** is disposed adjacent and posterior to the jaw support **52**. In **FIG. 6**, scale **100** shows that approximately twenty (20) centimeters of suture **20** are attached to needle **18**. It should be noted that the figure is not to scale as it appears that the distance from the predetermined point to the first graduation is greater than 5 cm and that while suture **20** appears loose in **FIGS. 6 and 7**, in actuality suture **20** would be slightly tensioned or straightened as shown in **FIG. 2** to give an accurate reading. Furthermore, it is necessary that suture **20** be drawn along a direct line from its point of connection with needle **18** to give an accurate measurement. Care should be taken that suture **20** not get caught on, or bend around the distal most ends **15** and **17** of jaws **14** and **16**, respectively, as this would give an incorrect measurement indicating a smaller amount of suture **20** left than is actually the case.

[**0040**] **FIG. 7** illustrates the situation in which one or more stitches have been sewn leaving approximately ten (10) centimeters of suture **20** available for use. The accuracy of scale **100** is ±0.6 graduations, or in the present example ±0.6 centimeters. The ability of the surgeon to discern the

remaining length of suture **20** easily and readily enables the surgeon to predict the number of sutures that can be safely sewn before it is necessary to remove suturing apparatus **10** for reloading.

[**0041**] Although suturing apparatus **10** will be periodically removed for reloading, the addition of attached scale **100** permits the surgeon to minimize the number of reloading operations that must be performed due to guess work involved in determining the amount of suture **20** remaining. This enables the surgeon to minimize the time of the procedure and optimize the quantity of suture material used. Scale **100** is envisioned to be incorporated into the structure of tubular housing **12** during the manufacturing process wherein graduations **110** would be etched, embossed or otherwise permanently part of tubular housing **12**.

[**0042**] Alternately, scale **100** and graduations **110** could be supplied as part of a kit to allow the surgeon to select the units of measurement and the length of scale **100**. Furthermore, supplying scale **100** in kit form allows existing owners of suturing apparatus **10** to take full advantage of this disclosure without the need to purchase new suturing apparatus **10**. For example, the kit could include several scales **100** having different ranges of graduations, different units of measurement, or numerous combinations of the preceding depending on the demands of the marketplace. In one embodiment, each scale **100** that is supplied as part of a kit would has an adhesive backing for attachment to tubular housing **12** and that this adhesive backing would securely attach scale **100** to tubular housing **12** to alleviate any concerns about scale **100** becoming dislodged in the cavity during the endoscopic procedure.

[**0043**] The preferred method for attaching scale **100** is to place scale **100** on heat shrinkable tubing. During preparation for surgery, the heat shrinkable tubing would be placed over the distal end of the surgical instrument and moved towards the proximal end along the longitudinal axis of the instrument. Once the heat shrinkable tubing is properly positioned, a flameless heat source is applied uniformly to the heat shrinkable tubing. Once the heat shrinkable tubing has shrunk to its designed size, and conformed to the shape of the surgical instrument, the heat source is removed leaving the surgical instrument with a measuring apparatus properly positioned for use. Further still, the kit may include an assembly template or other calibration device to ensure that scale **100** is disposed along tubular housing **12** with the proper orientation and proper longitudinal positioning from the predetermined point. The tubular housing **12** and heat shrinkable tubing may include reference marks that are aligned by placing the heat shrinkable tubing on tubular housing **12**. This is essential so that each suturing apparatus **10** will produce the same accurate measurements and ensure highly repeatable results for the surgeon.

[**0044**] Referring now to **FIG. 4**, the use of suturing apparatus **10** including scale **100** to suture tissue and measure the remaining amount of suture **20** will now be described. As noted above, scale **100** is disposed along the longitudinal axis of tubular housing **12** and posterior to jaws **14**, **16** with suture **20** extending from a predetermined point which is preferably the connection point with needle **18**. During laparoscopic suturing, the surgeon closes jaws **14**, **16** about the tissue, forcing needle **18** and suture **20** to pierce the tissue and passes control of the needle **20** between jaws **14** and **16**. Next, the surgeon then takes a grasping tool **150** and grabs the distal end of suture **20** with grasping tool **150**. Using grasping tool **150**, the surgeon holds suture **20** taut against the surface of scale **100** thereby allowing the surgeon to measure the length of suture **20**. By holding suture **20** taut against scale **100**, the surgeon is able to read the remaining length of suture **20** accurately. Again, care should be taken to ensure that suture **20** extends in a generally straight line from the predetermined point to scale **100** and does not become wrapped around the distal most ends of the jaws which would cause an inaccurate reading.

[**0045**] It should be noted that by measuring the remaining usable length of suture after a stitch, the surgeon can estimate the number of stitches that can be performed before having to reload a new needle and suture to a fairly certain degree of accuracy. This asset is not limited to endoscopic uses of measuring structure on suture manipulating instruments, but rather, may also find useful application in open surgery.

[**0046**] Alternatively, the surgeon may pass needle **18** through the tissue and move suturing apparatus **10** adjacent the tissue and then take the measurement. As noted above, the measurement is taken with suture **20** extending from a predetermined point and with at least one of jaws **14** and **16** in a predetermined position corresponding to the calibration of scale **100** on suturing apparatus **10**.

[**0047**] Turning to **FIG. 8**, the distal end of a surgical suturing apparatus in accordance with a further embodiment is illustrated. This particular surgical instrument **210** includes a tubular housing **212** with only one movable or pivotably hinged jaw **216** disposed at the distal end of tubular housing **212**. A needle **218** is removaby receivable by an aperture in jaw **216**. A suture **220** is attached to the end of needle **218**, which establishes the predetermined point for the measuring structure of this apparatus, and the remaining length of suture **220** is disposed along the longitudinal axis of tubular housing **212**. Scale **100** is disposed near the distal end of tubular housing **212** and preferably covers the entire outer perimeter of tubular housing **212** so that graduations **110** are visible to the surgeon regardless of the orientation surgical suturing apparatus **210**. Scale **100** is calibrated to read accurately with jaw **216** in the predetermined position, i.e., fully open, fully closed or some predetermined position in between.

[**0048**] In **FIG. 9**, a surgical suturing apparatus in accordance with yet another embodiment is illustrated. As in previous embodiments, the surgical suturing apparatus **310** has a scale **100** disposed near the distal end of a tubular housing **312**. A suture **320** extends from the most distal end of tubular housing **312** with a needle **318** at the distal end of suture **320**. Needle **318** and suture **320** are attached to a cartridge carrier **322** that is removably attached to tubular housing **312**. It is preferred that scale **100** and graduations **110** are disposed such that graduations **110** encompass the entire outer perimeter of tubular housing **312** of surgical suturing apparatus **310**.

[**0049**] Referring to **FIG. 10**, a surgical instrument in accordance with a further embodiment is shown. Similar to previous instruments, surgical instrument **510** is particularly arranged for laparoscopic or other minimally invasive surgery and it includes an elongate tubular housing **512**. Surgical instrument **510** has a grasping tool **514** at the distal end of tubular housing **512**. This instrument permits the surgeon to grasp a suture **520** and determine the length of the unused portion. Once again, scale **100** is disposed along the distal

end of tubular housing **512** just posterior to grasping tool **514**. Having scale **100** disposed in this location permits the surgeon to determine the length of suture **520** accurately by moving suture **520** with grasping tool **514** along the side of tubular housing **512** to measure the length of suture **520**. It is preferred that scale **100** and graduations **110** cover the outer perimeter of tubular housing **512** so that the surgeon can view graduations **110** without having to reposition surgical instrument **510**. The surgical instrument **510** may be used to manipulate a needle and suture or may be used in conjunction with a suturing apparatus.

[0050] It will be understood that various modifications may be made to the embodiments disclosed herein. For example, the unit may be color coded to indicate the range and units of measurement. When supplied as part of a kit, it is fully compatible with other laparoscopic surgical instruments such as scissors, knot-tying tools, and other tools. Further still, other methods for disposing measuring structures on surgical instruments such as shrink-wrapping may be employed. Therefore, the above description should not be construed as limiting, but merely as exemplifications of preferred embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

[0051] The foregoing is considered illustrative only of the principles of the measuring apparatus. Further, this is not intended to be limited to the exact structure, construction and operation shown and described.

What is claimed is:

1. A surgical instrument for manipulating a needle and suture comprising:

an elongate member having a distal end configured to manipulate a needle and suture;

a scale on at least a part of the elongate member and extending from the distal end, the scale having at least one graduation; and

a predetermined point on the elongate member, wherein the scale indicates the distance from the predetermined point to the at least one graduation.

2. The surgical instrument as recited in claim 1, wherein the elongate member includes at least one jaw and the predetermined point is disposed on the jaw.

3. The surgical instrument as recited in claim 2, wherein the at least one jaw has a recess configured to retain a needle carrying a suture and the predetermined point is located on the needle.

4. The surgical instrument as recited in claim 2, wherein the at least one jaw has a recess configured to retain a needle carrying a suture and the predetermined point is located at a point of connection between the suture and the needle.

5. The surgical instrument as recited in claim 4, wherein the point of connection is at one end of the needle.

6. The surgical instrument as recited in claim 4, wherein the point of connection is located between the ends of the needle.

7. The surgical instrument as recited in claim 2, wherein the at least one jaw is movable relative to the elongate member, wherein the distance from the predetermined point and the scale is calibrated with the at least one movable jaw in a predetermined position.

8. The surgical instrument as recited in claim 7, wherein elongate member includes two movable jaws.

9. The surgical instrument as recited in claim 8, wherein the two movable jaws are configured to pass a needle carrying a suture therebetween.

10. The surgical instrument as recited in claim 1, wherein the scale includes a plurality of graduations.

11. The surgical instrument as recited in claim 1, wherein the scale is provided on a material affixed to the elongate member.

12. The surgical instrument as recited in claim 11, wherein the scale is located on shrink wrap affixed to the elongate member.

13. The surgical instrument as recited in claim 11, wherein the scale is located on at least one longitudinally extending strip of material.

14. The surgical instrument as recited in claim 11, wherein the scale is etched into the elongate member.

15. The surgical instrument as recited in claim 1, wherein the at least one graduation indicates the distance in centimeters.

16. The surgical instrument as recited in claim 1, wherein the at least on jaw is configured for grasping a needle carrying a suture.

17. A kit to assist manipulation of a suture with an elongate instrument comprising:

a scale configured to be attached to the distal end of a suture manipulating instrument; and

a template to calibrate the position of the scale relative to a predetermined point on the distal end of the instrument.

18. The kit as recited in claim 17, wherein the scale is provided on a shrink wrap material.

19. A method of manipulating a suture comprising:

providing an elongate suture manipulating instrument configured to hold a first end of a suture at a predetermined point on a distal end of the instrument and a scale having at least one graduation provided on the instrument at a location remote from the distal end;

grasping a second end of the suture with a separate device; and

drawing the suture along the instrument adjacent the scale so that a second end of the suture is adjacent the at least one graduation on the scale to measure the length of suture.

20. The method as recited in claim 19, wherein the step of drawing is performed while the suture is being passed through tissue.

21. The method as recited in claim 19, wherein the step of drawing is performed after the suture is passed through tissue.

22. In a surgical suturing apparatus including an elongate member having a proximal end and a distal end and a longitudinal axis; a pair of jaws at the distal end, at least one of the pair of jaws being movable, the pair of jaws each having a recess for receiving a suture carrying needle; needle retaining structure in each jaw of the pair of jaws, the needle retaining structure extending from the respective jaw toward the proximal end; and a handle at the proximal end including structure for alternately advancing and retracting the needle retaining structure the improvement comprising;

a scale defined on the elongate member, the scale extending along the longitudinal axis of the elongate member and having graduations for measuring the length of the suture.

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