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(54) **Surgical stapling instrument structured to deliver medical agents**

Zur Einbringung von Heilmittel ausgestaltetes, chirurgisches Klammersetzgerät

Agrafeuse chirurgicale adaptée pour l'introduction des médicaments

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Description

FIELD OF THE INVENTION

[0001] The present invention generally relates to surgical instruments. The invention more particularly relates to delivery and application of medical agents in association with the use of surgical instruments to promote closure and healing of severed and stapled tissue.

BACKGROUND

[0002] Conventional surgical staplers that can be used to simultaneously make longitudinal incisions in tissue and apply lines of staples on opposing sides of the incisions are known in the art. Such instruments commonly include a pair of cooperating jaw members that, when employed in endoscopic or laparoscopic applications, are capable of passing through a cannula passageway. One of the jaw members typically receives a staple cartridge having at least two laterally spaced rows of staples. The other jaw member defines an anvil having staple-forming pockets correspondingly aligned with the rows of staples in the cartridge. Such stapling instruments may also include a plurality of reciprocating wedges that pass through openings in the staple cartridge when driven and engage drivers supporting the staples to effect the firing of the staples toward the anvil and through tissue.

[0003] Examples of surgical staplers suitable for use with endoscopic applications are described in U.S. Patent Application No. US 2004/0232196 A1. In operation of the surgical stapler, a clinician closes or clamps the jaw members of the stapler on tissue to position the tissue prior to firing or activation of the stapler. Once the clinician has determined that the jaw members are clamping the tissue in a desired position, then the surgical stapler can be fired by the clinician to create an incision in the tissue and at the same time staple tissue surrounding the incisions. This simultaneous action of the stapler avoids complications that often arise when the severing and stapling operations are performed sequentially (or at different times) with different surgical tools (i.e., one device is used to sever the tissue, and then another device is used to staple the tissue).

[0004] In general, application of certain medical agents to tissue incisions can promote healing, reduce the possibility of infection, and/or promote proper sealing of the incisions. If assisted by the action of such medical agents, many surgical staplers could achieve better surgical results with respect to enhanced healing, improved infection resistance, and improved sealing of tissue incisions. Examples of surgical staplers having a medical agent dispensing system are described in U.S. Patent Application Publication No. US2005/0230453 A1 and International Patent Application Publication No. WO-A-03/088845. However, the structure of many conventional surgical staplers, and the procedures in which such staplers are employed, do not leverage the benefits of medical agents or systems that dispense medical agents.

[0005] In view of the foregoing, there is a need for improved surgical instruments and medical agent dispensing systems than can more effectively and efficiently promote closure, treatment, and healing of tissue incisions severed and stapled during operations involving surgical staplers.

SUMMARY

[0006] The present invention provides a surgical severing/stapling instrument having a medical agent dispensing system as claimed hereinafter.

BRIEF DESCRIPTION OF THE FIGURES

[0007] The accompanying drawings, which are incorporated into and constitute a part of this specification, illustrate embodiments of the invention. Together with the description of the embodiments provided herein, the drawings serve to explain the principles of the present invention for those skilled in the art.

[0008] Figure 1 depicts an three-dimensional, partially cut-away, partially schematic view of a surgical instrument that may be provided in association with embodiments of a medical agent dispensing system in accordance with the present invention;

[0009] Figure 2 illustrates a disassembled, three-dimensional view of the end effector and a shaft portion of the surgical instrument of Figure 1;

[0010] Figure 3 includes schematic depictions of handle, shaft and end effector portions of the surgical instrument of Figure 1;

[0011] Figure 4 includes an enlarged view of portions of the shaft and end effector of the surgical instrument of Figure 3;

[0012] Figure 5 includes an enlarged three-dimensional view of portions of the shaft and handle portion of the surgical instrument of Figure 3;

[0013] Figure 6 includes an end view of the channel of the surgical instrument of Figure 2;

[0014] Figure 7 includes a schematic of a pump that may be employed in accordance with various embodiments of the invention;

[0015] Figure 8 includes a schematic of a pump that may be employed in accordance with various embodiments of the invention;

[0016] Figure 9 includes a process flow diagram illustrating various aspects of an example of a method for using embodiments of the medical agent dispensing system of the present invention;

[0017] Figure 10 illustrates a disassembled, three-dimensional view of the end effector and a shaft portion of a surgical instrument that may be configured in association with embodiments of a medical agent dispensing system of the present invention;

[0018] Figure 11 includes an enlarged three-dimensional view of the end effector of the surgical instrument

with the staple cartridge removed;

[0019] Figure 12 includes a schematic view of certain portions of the shaft and end effector of the surgical instrument;

[0020] Figure 13 includes a cut-away, three-dimensional view of certain portions of the shaft and end effector of the surgical instrument;

[0021] Figure 14 includes a three-dimensional view of the end effector of the surgical instrument;

[0022] Figure 15 includes a three-dimensional view of portions of the shaft and the end effector of the surgical instrument;

[0023] Figure 16 includes a schematic of portions of the handle portion and the shaft of the surgical instrument; and,

[0024] Figure 17 includes a process flow diagram illustrating various aspects of an example of a method for using embodiments of the medical agent dispensing system of the present invention.

DESCRIPTION

[0025] As applied herein, the term "tissue" may include a variety of human or animal tissues, membranes, or other organic substrates. The term "tissue" may also include any substance, substrate, or composition of matter capable of being severed and stapled by the various embodiments of surgical stapling/severing instruments described herein.

[0026] As applied herein, the term "medical agent" may include a variety of liquid chemicals, or other compositions of matter in liquid form that may be applied to tissues. Examples of "medical agents" may include, without limitation, hemostatic agents, healing agents, adhesives, sealants, antibacterial agents, infection-resistant agents, analgesics, and various other kinds of medicinal or beneficial substances.

[0027] With general reference to Figures 1 through 6, in association with various embodiments of the invention, a surgical severing/stapling instrument 10 includes a handle portion 20 connected to an implement portion 22. The implement portion 22 includes a shaft 24 which extends distally from the handle portion 20 and terminates in an end effector 26. The end effector 26 may include an actuator or E-beam firing mechanism ("firing bar") 28 that controls spacing between an elongated channel 30 and a pivotally translatable anvil 32 included within the end effector 26. It can be seen that the spacing between the channel 30 and the anvil 32 may be configured to promote effective stapling and severing of tissue during use of the surgical instrument 10 by a clinician, for example.

[0028] The handle portion 20 of the instrument 10 may include a pistol grip 34 toward which a closure trigger 36 may be pivotally drawn by the clinician, for example, to cause clamping or closing of the anvil 32 toward the channel 30 of the end effector 26. In operation, the tissue of a patient, for example, may be clamped by the closing of the anvil 32 toward the channel 30. A firing trigger 38 positioned adjacent to the closure trigger 36 can be pivotally drawn in the direction of the pistol grip 34 to substantially simultaneously staple and sever tissue clamped in the end effector 26 of the instrument 10. In a surgical operation, the clinician first activates the closure trigger 36 to clamp the tissue of a patient, for example. Once the clinician is satisfied with the positioning of the end effector 26, the closure trigger 36 may be drawn back to a fully closed and locked position proximate to the pistol grip 34. The firing trigger 38 of the instrument 10 may then be actuated to sever and staple the clamped tissue. The firing trigger 38 may springedly return to a normal, inactivated state when the clinician removes pressure applied to the firing trigger 38. A release button 40 positioned on the proximal end of the handle portion 20 may be pressed by the clinician to release the locked closure trigger 36 to its normally open position (as shown in Figure 1).

[0029] In various embodiments, the distal end of the shaft 24 may include a closure tube 52 structured to receive and contain portions of the components of the end effector 26, such as the anvil 32 and the channel 30. The closure tube 52 may also be structured to receive a spine 54 extending therethrough that supports a knife shaft 56 having a distally positioned severing edge 58. The knife shaft 56 may operatively interact with the firing bar 28 at the severing edge 58 of the knife shaft 56. A knife spring 60 may be inserted within the spine 54 and structured with a resilient downward bias that promotes proper and secure positioning of the knife shaft 56 within the spine 54. In operation, when the instrument 10 is fired, the knife shaft 56 and its severing edge 58 are moved through the channel 30 by a knife rod 61 to sever tissue clamped between the anvil 32 and the channel 30. The channel 30 may be structured to receive a removable staple cartridge 62 therein. The staple cartridge 62 may have multiple staple holes (such as illustratively representative staple holes 64, 66, 68) formed therein and through which multiple staples (not shown) may be driven to staple severed tissue when the instrument 10 is fired. In certain embodiments, the staple cartridge 62 may be an "ETS45" or "ETS60" six-row cartridge, for example, marketed by Ethicon Endo-Surgery, Inc., of Cincinnati, Ohio.

[0030] Examples of the structure and operation of typical surgical stapling instruments that may be provided in association with embodiments of the present invention are disclosed in a United States published patent application to Shelton et al. entitled, "Surgical Stapling Instrument having Separate Distinct Closing and Firing Systems" (U.S. Pub. No. 2004/0232196).

[0031] With regard to embodiments of a medical agent dispensing system that may be provided in conjunction with the surgical instrument 10, a delivery tube 72 is positioned to extend longitudinally through the spine 54, from the handle portion 20 of the instrument 10 to a lateral manifold 74. Agent tubes 78, 80 are positioned to communicate both with the lateral manifold 74 and with a

plurality of agent ports (such as illustratively representative agent ports 82, 84, 86) formed in the staple cartridge 62 generally adjacent to the staple holes 64, 66, 68 of the cartridge 62. The agent tubes 78, 80 may be structured for communication with the agent ports 82, 84, 86 in the staple cartridge 62 as shown in the end view of the cartridge 62 of Figure 6. While a row of agent ports 82, 84, 86 is shown positioned next to both sides of a longitudinal center line of the channel 30, it can be appreciated that more or less such agent ports 82, 84, 86 may be provided in the cartridge 62. For example, more agent ports 82, 84, 86 may be provided in place of one or more of the staple holes 64, 66, 68 formed in the cartridge 62. In various embodiments, one or more structures such as mounting blocks 79, 81 may be included within the channel 30 to facilitate securement and stability of the agent tubes 78, 80 (respectively) within the instrument 10 (see Figure 1). Also, it can be seen that the agent tubes 78, 80 (such as the left-hand side agent tube 78, as shown in Figure 4, for example) may be positioned generally adjacent to the knife shaft 56 as the agent tubes 78, 80 extend longitudinally through the shaft 24.

[0032] The handle portion 20 includes one or more medical agent storage reservoirs 92, 94 mounted on the handle portion 20 and in communication with the delivery tube 72. The storage reservoirs 92, 94 may contain a variety of medical agents, or components thereof, that can be beneficially applied to severed and stapled tissue by action of the dispensing system in connection with use of the surgical instrument 10. While multiple storage reservoirs 92, 94 are depicted on the instrument 10 for convenience of disclosure, certain embodiments of the invention may employ only a single storage reservoir, for example, or more than two storage reservoirs. It can be seen that employing multiple storage reservoirs 92, 94 can facilitate real-time mixing of multiple-component medical agents during operation of the medical agent dispensing system. For example, the use of multiple storage reservoirs 92, 94 facilitates combination and use of two-part liquid adhesives, for example, in connection with operation of the dispensing system within the instrument 10. In certain embodiments, the medical agents stored in the storage reservoirs 92, 94 may be the same type of medical agent or different types of medical agents.

[0033] Also, in various embodiments of the medical agent dispensing system of the present invention, an electric motor 98 may be included within the handle portion 20 and operatively associated with a pump 100 configured to be driven by the motor 98. Those skilled in the art will appreciate that the electric motor 98 may be any conventional battery-driven or AC-powered motor provided with specifications (e.g., a motor rating) suitable for safe and effective use of the motor 98 in association with operation of the surgical instrument 10. In certain embodiments, the electric motor 98 may be activated through conventional electrical circuitry or components 102 that can be operatively associated with the firing trigger 38, the release button 40, and/or an independent manual activation switch 104 of the instrument 10. The electrical circuitry 102 may be configured to activate the motor 98 automatically in association with the firing operation of the instrument 10, for example; and/or to activate the motor 98 manually through use of the switch 104 which may be pressed by the clinician, for example, when using the instrument 10.

[0034] With reference to Figures 7 and 8, in various embodiments, the pump 100 may include, for example and without limitation, a peristaltic pump 122 (as shown in Figure 7); a diaphragm pump 124 (as shown in Figure 8); a rotary pump; or a variety of other types of pumps that may be suitably applied as the pump 100 in accordance with embodiments of the invention.

[0035] With reference to Figure 9, a process flow diagram illustrates a method of applying the instrument 10 with various embodiments of the medical agent dispensing system in a surgical procedure performed on tissue. At step 202, the instrument 10 may be fired as described above to sever tissue and to apply staples to areas on both sides of an incision made in the tissue. At step 204, in connection with retraction of the knife shaft 56 from the severed/stapled tissue, the electric motor 98 may be activated to initiate rotation of the pump 100 at step 206. At step 208, the action of the pump 100 draws a quantity of a medical agent, or components combined to create a quantity of medical agent, from the storage reservoirs 92, 94 through the pump 100. At step 210, the medical agent is driven by the pump 100 through the delivery tube 72 (and associated tubing) to the lateral manifold 74. At step 212, the medical agent may be driven through the agent tubes 78, 80 to be dispensed at step 214 through the plurality of agent ports 82, 84, 86 formed in the staple cartridge 62. Once dispensed through the plurality of agent ports 82, 84, 86, the medical agent may then cover or deluge at least a portion of tissue areas severed/stapled by action of the instrument 10 at step 202.

[0036] With general reference to Figures 10 through 16, embodiments of the surgical severing/stapling instrument 10 may be structured with the closure tube 52 receiving and maintaining an end effector 26 including a modified anvil 254 and the channel 30. The channel 30 may be structured to removably receive a standard staple cartridge 256 therein. The staple cartridge 256 may have rows of multiple staple holes (such as illustratively representative staple holes 258, 260, 262, 264) formed therein and through which multiple staples (not shown) may be driven to staple severed tissue when the instrument 10 is fired. In certain embodiments, the staple cartridge 256 may be an "ETS45" or "ETS60" six-row cartridge, for example, marketed by Ethicon Endo-Surgery, Inc., of Cincinnati, Ohio. As shown more particularly in Figure 11, the anvil 254 may include multiple rows of staple receiving depressions 266, 268, 270, 272 positioned in a corresponding relationship with the rows of staple holes 258, 260, 262, 264 of the staple cartridge 256. The multiple rows of staple depressions 266, 268, 270, 272 function to receive staples driven through the

staple holes 258, 260, 262, 264 when the instrument 10 is fired to staple tissue.

[0037] With regard to embodiments of a medical agent dispensing system that may be provided in conjunction with the surgical instrument 10, a delivery tube 274 is positioned to extend longitudinally through the spine 54 to a lateral manifold 276. Agent tubes 278, 280 are positioned to communicate with the lateral manifold 276 and with one or more agent port blocks 282, 284 (respectively) having a plurality of agent ports (such as illustratively representative agent ports 286, 288, 290, 292) formed therein. In general, Figures 12 through 15 illustrate the manner in which the agent tubes 278, 280 may be routed through the spine 54 to the anvil 254 of the instrument 10. As shown in Figure 11, the agent port blocks 282, 284 may be connected to or formed on the anvil 254 generally adjacent to the rows of staple receiving depressions 266, 268, 270, 272 formed in the anvil 254. The agent ports 286, 288, 290, 292 may be formed on inner portions 282A, 284A of the agent port blocks 282, 284 to maximize the proximity of the agent ports 286, 288, 290, 292 to the staple receiving depressions 266, 268, 270, 272. It can be appreciated that the staple receiving depressions 266, 268, 270, 272 are proximate to severed/stapled tissue once the instrument 10 is fired. Thus, the positioning and sizing of the agent ports 286, 288, 290, 292 formed in the agent port blocks 282, 284 may be configured to maximize the portions of the severed/stapled tissue that can be covered or deluged by a medical agent delivered through the agent ports 286, 288, 290, 292 during operation of the instrument 10.

[0038] In various embodiments, the handle portion 20 of the instrument 10 may include one or more medical agent storage reservoirs 302, 304 mounted thereon and in communication with the delivery tube 274 through a pump 306. With particular reference to Figures 7, 8 and 16, the pump 306 may include, for example and without limitation, the peristaltic pump 122 (as shown in Figure 7); the diaphragm pump 124 (as shown in Figure 8); a rotary pump (as shown in Figure 16); or a variety of other pumps that may be suitably applied in accordance with embodiments of the invention. The storage reservoirs 302, 304 may contain a variety of medical agents, or components thereof, that can be beneficially applied to severed and stapled tissue by the dispensing system in connection with use of the surgical instrument 10. While multiple storage reservoirs 302, 304 are depicted on the instrument 10 for convenience of disclosure, certain embodiments of the invention may employ only a single storage reservoir, for example, or more than two storage reservoirs. It can be seen that employing multiple storage reservoirs 302, 304 can facilitate real-time mixing of multiple-component medical agents during operation of the medical agent dispensing system. For example, one storage reservoir 302 may contain a first liquid and the other storage reservoir 304 may contain a second liquid. The first liquid may be the same kind of liquid as the second liquid, or the liquids may be different medical agents or components of medical agents. For example, multiple storage reservoirs 302, 304 can facilitate the use of two-part liquid adhesives designed to be combined during medical agent dispensing operations of the instrument 10. In operation, the medical agents stored in the storage reservoirs 302, 304 may be drawn to and driven through the delivery tube 274 by the action of the pump 306. The pump 306 may draw medical agents from the storage reservoirs 302, 304 through a reservoir manifold 309 in communication with the storage reservoirs 302, 304.

[0039] Also, in various embodiments of the medical agent dispensing system of the present invention, an electric motor 310 may be included within the handle portion 20 and operatively associated with the pump 306 to cause the pump 306 to draw medical agents from the storage reservoirs 302, 304. Those skilled in the art will appreciate that the electric motor 310 may be any conventional battery-driven or AC-powered motor provided with specifications (e.g., a motor rating) suitable for safe and effective use of the motor 310 in association with operation of the surgical instrument 10. In certain embodiments, the electric motor 310 may be activated as discussed above in association with the firing trigger 38, the release button 40, and/or the independent manual activation switch 104 of the instrument 10. In addition, as discussed above, the electrical circuitry 102 may be configured to activate the motor 310 automatically in association with the firing operation of the instrument 10, for example; and/or to activate the motor 310 manually through use of the switch 104 which may be pressed by the clinician, for example, when using the instrument 10.

[0040] With reference to Figure 17, a process flow diagram illustrates a method of applying the instrument 10 with various embodiments of the medical agent dispensing system in a surgical procedure performed on tissue. At step 402, the instrument 10 may be fired as described above to sever tissue and to apply staples to areas on both sides of an incision made in the tissue. At step 404, in connection with retraction of the knife shaft 56 from the severed/stapled tissue, the electric motor 310 may be activated to initiate the action of the pump 306 at step 406. At step 408, the pump 306 drives a quantity of a medical agent, or components combined to create a quantity of the medical agent, from the storage reservoirs 302, 304 through the pump 306 (and associated tubing). At step 410, the medical agent is driven and delivered through the delivery tube 274 to the lateral manifold 276 by the action of the pump 306. At step 412, the medical agent may be driven through the agent tubes 278, 280 to be dispensed at step 414 through the agent ports 286, 288, 290, 292 formed in the agent port blocks 282, 284 of the anvil 254. Once dispensed through the agent ports 286, 288, 290, 292, the medical agent may then cover or deluge at least a portion of tissue areas severed and stapled by action of the instrument 10 at step 402.

[0041] It will be appreciated that the terms "proximal" and "distal" may be used herein as convenient terms of relative orientation, such as with reference to a clinician

gripping a handle of an instrument. For example, the end effector 26 may be considered "distal" with respect to the "proximal" handle portion 20 (see, e.g., Figure 1). It will be further appreciated that, for convenience and clarity of disclosure, spatial terms of relative orientation such as "vertical" and "horizontal" or "downward" and "upward" may be used herein with respect to the drawings. Those skilled in the art will appreciate, however, that surgical instruments may be used in many orientations and positions, and such terms are not intended to be limiting and absolute.

[0042] The examples presented herein are intended to illustrate potential and specific implementations of the present invention for those skilled in the art. No particular aspect or aspects of the examples included herein are necessarily intended to limit the scope of the present invention, as defined by the appended claims.

[0043] It is to be understood that the figures and descriptions of the present invention have been simplified to illustrate elements that are relevant for a clear understanding of the present invention, while eliminating, for purposes of clarity, other elements. Those of ordinary skill in the art will recognize, however, that these and other elements may be desirable in a typical computer system or database system. However, because such elements are well known in the art and because they do not facilitate a better understanding of the present invention, a discussion of such elements may not be provided herein.

[0044] Any element expressed herein as a means for performing a specified function is intended to encompass any way of performing that function including, for example, a combination of elements that perform that function. Furthermore the invention, as defined by such means-plus-function claims, resides in the fact that the functionalities provided by the various recited means are combined and brought together in a manner as defined by the appended claims. Therefore, any means that can provide such functionalities may be considered equivalents to the means shown herein.

[0045] In various embodiments of the present invention disclosed herein, a single component may be replaced by multiple components, and multiple components may be replaced by a single component, to perform a given function or functions. Except where such substitution would not be operative to practice embodiments of the present invention, such substitution is within the scope of the present invention.

[0046] While the present invention has been illustrated by description of several embodiments and while the illustrative embodiments have been described in considerable detail, it is not the intention of the applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications may readily appear to those skilled in the art. The present invention has been discussed in terms of endoscopic procedures and apparatus. However, use herein of terms such as "endoscopic" should not be construed to limit the present invention to a surgical stapling and severing instrument for use only in conjunction with an endoscopic tube (i.e., trocar). On the contrary, it is believed that surgical instruments structured in accordance with the present invention may find use in many surgical procedures, including but not limited to laparoscopic procedures and open procedures.

Claims

1. A surgical severing/stapling instrument (10) for use in a laparoscopic procedure, the instrument including a medical agent dispensing system, and comprising:

a handle portion (20) including at least one storage reservoir (92, 94; 302, 304) structured for storing at least a component of a medical agent;
a shaft portion (24) connected to the handle portion, the shaft portion including a closure tube (52) with a spine (54) extending therethrough and a delivery tube (72; 274) positioned to extend longitudinally through the spine from the handle portion to a lateral manifold (74; 276), the lateral manifold being positioned within the spine, and wherein the delivery tube is in communication with the storage reservoir, wherein the spine supports a knife shaft (56), the shaft portion further including a knife spring (60) inserted within the spine and structured to bias the knife shaft away from the delivery tube and into position within the spine;
an end effector (26) operatively associated with the shaft portion, the end effector including first and second jaw components (30, 254) one of which comprises a channel having a staple cartridge removably positioned therein and the other of which comprises an anvil;
first and second agent tubes (78, 80; 278, 280) in communication with the delivery tube, the agent tubes extending from the shaft portion and being positioned to communicate both with the lateral manifold and with at least one agent port (82, 84, 86; 286, 288, 290, 292) formed in one of the jaw components of the end effector for dispensing the medical agent therethrough, wherein the agent tubes are positioned to extend longitudinally through the shaft portion adjacent to the knife shaft, one on each side of the knife shaft, and with both agent tubes passing around the knife spring;
wherein the handle portion (20) further includes a pump (100; 306) in communication with the storage reservoir, the delivery tube (72; 274) being in communication with the storage reservoir through the pump such that a medical agent is deliverable from the storage reservoir to the de-

livery tube during operation of the pump, wherein the pump (100; 306) is configured, upon actuation, to draw the medical agent from the storage reservoir into the delivery tube and the agent tube to dispense the medical agent through the agent port in the end effector.

2. The instrument of claim 1, wherein the first component of the end effector (26) comprises a channel (30) having a staple cartridge (62) removably positioned therein, and wherein the agent tubes (78, 80) extend from the shaft portion to communicate with the agent port (82, 84, 86) formed in the staple cartridge for dispensing the medical agent therethrough.

3. The instrument of claim 1, wherein the second jaw component of the end effector comprises an anvil (254), and wherein the agent tubes (278, 280) extend from the shaft portion to communicate with the agent port (286, 288, 290, 292) formed in the anvil (254) for dispensing the medical agent therethrough.

4. The instrument of any one of claims 1 to 3, wherein the medical agent includes a hemostatic agent stored in at least one said storage reservoir.

5. The instrument of any one of claims 1 to 3, wherein the medical agent includes an adhesive stored in at least one said storage reservoir.

6. The instrument of any preceding claim, wherein the pump (100) is selected from the group consisting of a rotary pump, a peristaltic pump (122), or a diaphragm pump (124).

7. The instrument of any preceding claim, wherein the first agent tube communicates with a first plurality of agent ports, and the second agent tube communicates with a second plurality of agent ports.

8. The instrument of claim 2, wherein the agent port (82, 84, 86) is formed generally adjacent to at least one staple hole (64, 66, 68) of the staple cartridge.

9. The instrument of any preceding claim, further comprising at least a second storage reservoir (92, 94; 302, 304) in communication with the delivery tube (74, 274), the second storage reservoir being structured for storing at least a component of the medical agent.

10. The instrument of claim 9, further including an agent component stored in the first storage reservoir and an agent component stored in the second storage reservoir which are designed to be combined to form the medical agent.

11. The instrument of any preceding claim, wherein the pump (100, 306) is operatively associated with a motor (98; 310) in the handle portion, the motor being operable to cause the pump to draw the medical agent from the storage reservoir to the delivery tube.

12. The instrument of claim 11, the motor (98; 310) is operatively associated with an electrical circuit (102).

Patentansprüche

1. Chirurgisches Schneide-/Klammerinstrument (10) zur Verwendung bei einer Laparoskopie, das ein Ausgabesystem für eine medizinische Substanz umfasst, wobei das Instrument aufweist:

- einen Griffbereich (20), der wenigstens einen Lagerbehälter (92, 94; 302, 304) umfasst, welcher zum Lagern wenigstens einer Komponente einer medizinischen Substanz strukturiert ist;
- einen Schaftbereich (24), der mit dem Griffbereich verbunden ist, wobei der Schaftbereich eine Verschlussleitung (52) mit einem sich dort hindurch erstreckenden Rücken (54) und eine Zuführleitung (72; 274) umfasst, die so positioniert ist, dass sie sich in Längsrichtung durch den Rücken vom Griffbereich zu einem seitlichen Verteiler (74; 276) erstreckt, der im Rücken positioniert ist, und wobei die Zuführleitung mit dem Lagerbehälter in Verbindung steht, wobei der Rücken einen Messerschaft (56) stützt, wobei der Schaftbereich ferner eine Messerfeder (60) aufweist, die in den Rücken eingeführt und so strukturiert ist, dass sie den Messerschaft von der Zuführleitung weg und positionsgerecht im Rücken vorspannt;
- einen End-Effektor (26), der dem Schaftbereich betrieblich zugeordnet ist, wobei der End-Effektor eine erste und eine zweite Backenkomponente (30, 254) umfasst, von denen eine einen Kanal mit einem Klammermagazin, das entfernbar darin angeordnet ist, aufweist und die andere einen Amboss aufweist;
- erste und zweite Substanzleitungen (78, 80; 278, 280) in Verbindung mit der Zuführleitung, wobei sich die Substanzleitungen von dem Schaftbereich erstrecken, so dass sie sowohl mit dem seitlichen Verteiler als auch mit wenigstens einem Substanzport (82, 84, 86; 286, 288, 290, 292) in Verbindung stehen, der in einer der Backenkomponenten des End-Effektors gebildet ist, um die medizinische Substanz durch diesen auszugeben, wobei die Substanzleitungen so positioniert sind, dass sie sich in Längsrichtung durch den Schaftbereich neben dem Messerschaft erstrecken, und zwar eine an jeder Seite des Messerschafts, wobei beide Sub-

stanzleitungen um die Messerfeder herum gehen,

wobei der Griffbereich (20) weiter eine Pumpe (100; 306) in Verbindung mit dem Lagerbehälter umfasst, wobei die Zuführleitung (72; 274) durch die Pumpe in Verbindung mit dem Lagerbehälter derart steht, dass eine medizinische Substanz während des Betriebes der Pumpe aus dem Lagerbehälter in die Zuführleitung lieferbar ist, wobei die Pumpe (100; 306) bei Betätigung dazu ausgelegt ist, die medizinische Substanz aus dem Lagerbehälter in die Zuführleitung und die Substanzleitung zu ziehen, um die medizinische Substanz durch den Substanzport in den End-Effektor auszugeben.

2. Instrument nach Anspruch 1, bei dem die erste Komponente des End-Effektors (26) einen Kanal (30) mit einem darin entfernbar angeordneten Klammermagazin (62) aufweist und bei dem sich die Substanzleitungen (78, 80) von dem Schaftbereich erstrekken, so dass sie mit dem Substanzport (82, 84, 86) in Verbindung stehen, der in dem Klammermagazin gebildet ist, um die medizinische Substanz durch diesen auszugeben.

3. Instrument nach Anspruch 1, bei dem die zweite Backenkomponente des End-Effektors einen Amboss (254) aufweist und bei dem sich die Substanzleitungen (278, 280) von dem Schaftbereich erstrekken, so dass sie mit dem Substanzport (286, 288, 290, 292) in Verbindung stehen, der in dem Amboss (254) gebildet ist, um die medizinische Substanz durch diesen auszugeben.

4. Instrument nach einem der Ansprüche 1 bis 3, bei dem die medizinische Substanz eine Blut stillende Substanz umfasst, die in wenigstens einem genannten Lagerbehälter gelagert ist.

5. Instrument nach einem der Ansprüche 1 bis 3, bei dem die medizinische Substanz ein Klebmittel umfasst, das in wenigstens einem genannten Lagerbehälter gelagert ist.

6. Instrument nach einem vorangehenden Anspruch, bei dem die Pumpe (100) aus der Gruppe bestehend aus einer Drehpumpe, einer peristaltischen Pumpe (122) oder einer Membranpumpe (124) ausgewählt ist.

7. Instrument nach einem vorangehenden Anspruch, bei dem die erste Substanzleitung mit einer ersten Vielzahl von Substanzports in Verbindung steht und die zweite Substanzleitung mit einer zweiten Vielzahl von Substanzports in Verbindung steht.

8. Instrument nach Anspruch 2, bei dem der Substanzport (82, 84, 86) im Allgemeinen benachbart zu wenigstens einem Klammerloch (64, 66, 68) der Klammerkassette gebildet ist.

9. Instrument nach einem vorangehenden Anspruch, das weiter wenigstens einen zweiten Lagerbehälter (92, 94; 302, 304) in Verbindung mit der Zuführleitung (74, 274) aufweist, wobei der zweite Lagerbehälter zum Lagern wenigstens einer Komponente der medizinischen Substanz strukturiert ist.

10. Instrument nach Anspruch 9, das weiter eine Substanzkomponente, welche in dem ersten Lagerbehälter gelagert ist, und eine Substanzkomponente, welche in dem zweiten Lagerbehälter gelagert ist, umfasst, wobei sie so ausgeführt sind, dass sie kombiniert die medizinische Substanz bilden.

11. Instrument nach einem vorangehenden Anspruch, bei dem die Pumpe (100, 306) betrieblich einem Motor (98; 310) in dem Griffbereich zugeordnet ist, wobei der Motor so betreibbar ist, dass er bewirkt, dass die Pumpe die medizinische Substanz aus dem Lagerbehälter in die Zuführleitung pumpt.

12. Instrument nach Anspruch 11, bei dem der Motor (98; 310) betrieblich einer elektrischen Schaltung (102) zugeordnet ist.

Revendications

1. Instrument de sectionnement/agrafage chirurgical (10) pour l'utilisation dans une procédure laparoscopique, l'instrument comprenant un système de distribution d'un agent médical, et comprenant :

- une partie de poignée (20) comprenant au moins un réservoir de stockage (92, 94 ; 302, 304), structuré pour stocker au moins un composant d'un agent médical ;
- une partie d'arbre (24) connectée à la partie de poignée, la partie d'arbre comprenant un tube de fermeture (52) avec une cannelure (64) s'étendant à travers lui et un tube de distribution (72, 274) positionné de manière à s'étendre longitudinalement à travers la cannelure depuis la partie de poignée jusqu'à un collecteur latéral (74 ; 276), le collecteur latéral étant positionné à l'intérieur de la cannelure, et dans lequel le tube de distribution est en communication avec le réservoir de stockage, dans lequel la cannelure supporte un arbre de couteau (56), la partie d'arbre comportant en outre un ressort de couteau (60) inséré à l'intérieur de la cannelure et structuré de manière à précontraindre l'arbre de couteau à l'écart du tube de distribution et en position à l'intérieur de la cannelure ;

- un actionneur final (26) associé de manière opérationnelle à la partie d'arbre, l'actionneur final comprenant un premier et un second composant de mâchoire (30, 254), dont l'un comprend un canal ayant une cartouche d'agrafes positionnée de manière amovible à l'intérieur, et l'autre comprend une enclume ;
- un premier et un second tube d'agent (78, 80, 278, 280) en communication avec le tube de distribution, les tubes d'agent s'étendant depuis la partie d'arbre et étant positionnés pour communiquer avec le collecteur latéral et avec au moins un orifice d'agent (82, 84, 86 ; 286, 288, 290, 292) formé dans l'un des composants de mâchoire de l'actionneur final, afin de distribuer l'agent médical à travers lui,

dans lequel les tubes d'agent sont positionnés de manière à s'étendre longitudinalement à travers la partie d'arbre en position adjacente à l'arbre de couteau, un de chaque côté de l'arbre de couteau, et les deux tubes d'agent passant autour du ressort de couteau ;
dans lequel la partie de poignée (20) comprend en outre une pompe (100, 306) en communication avec le réservoir de stockage, le tube de distribution (72 ; 274) étant en communication avec le réservoir de stockage à travers la pompe, de sorte qu'un agent médical puisse être distribué du réservoir de stockage au tube de distribution pendant le fonctionnement de la pompe, dans lequel la pompe (100, 306) est configurée, lors de l'actionnement, pour attirer l'agent médical du réservoir de stockage dans le tube de distribution et le tube d'agent, afin de distribuer l'agent médical à travers l'orifice d'agent dans l'actionneur final.

2. Instrument selon la revendication 1, dans lequel le premier composant de l'actionneur final (26) comprend un canal (30) ayant une cartouche d'agrafes (62) positionnée de manière amovible à l'intérieur, et dans lequel les tubes d'agent (78, 80) s'étendent depuis la partie d'arbre pour communiquer avec l'orifice d'agent (82, 84, 86) formé dans la cartouche d'agrafes afin de distribuer l'agent médical à travers lui.

3. Instrument selon la revendication 1, dans lequel le second composant de mâchoire de l'actionneur final comprend une enclume (254), et dans lequel les tubes d'agent (278, 280) s'étendent depuis la partie d'arbre pour communiquer avec l'orifice d'agent (286, 288, 290, 292) formé dans l'enclume (254), afin de distribuer l'agent médical à travers lui.

4. Instrument selon l'une quelconque des revendications 1 à 3, dans lequel l'agent médical comprend un agent hémostatique, stocké dans ledit au moins un réservoir de stockage.

5. Instrument selon l'une quelconque des revendications 1 à 3, dans lequel l'agent médical comprend un adhésif, stocké dans ledit au moins un réservoir de stockage.

6. Instrument selon l'une quelconque des revendications précédentes, dans lequel la pompe (100) est choisie dans le groupe constitué d'une pompe rotative, d'une pompe péristaltique (122), ou d'une pompe à diaphragme (124).

7. Instrument selon l'une quelconque des revendications précédentes, dans lequel le premier tube d'agent communique avec une première pluralité d'orifices d'agent, et le second tube d'agent communique avec une seconde pluralité d'orifices d'agent.

8. Instrument selon la revendication 2, dans lequel l'orifice d'agent (82, 84, 86) est formé généralement de manière adjacente à au moins un orifice d'agrafe (64, 66, 68) de la cartouche d'agrafes.

9. Instrument selon l'une quelconque des revendications précédentes, comprenant en outre au moins un second réservoir de stockage (92, 94 ; 302, 304) en communication avec le tube de distribution (74, 274), le second réservoir de stockage étant structuré pour stocker au moins un composant de l'agent médical.

10. Instrument selon la revendication 9, comprenant en outre un composant d'agent stocké dans le premier réservoir de stockage et un composant d'agent stocké dans le second réservoir de stockage, qui sont conçus pour être combinés afin de former l'agent médical.

11. Instrument selon l'une quelconque des revendications précédentes, dans lequel la pompe (100, 306) est associée de manière opérationnelle à un moteur (98, 310) dans la partie de poignée, le moteur pouvant être actionné pour provoquer l'attraction par la pompe de l'agent médical, du réservoir de stockage vers le tube de distribution.

12. Instrument selon la revendication 11, le moteur (98, 310) étant associé de manière opérationnelle à un circuit électrique (102).

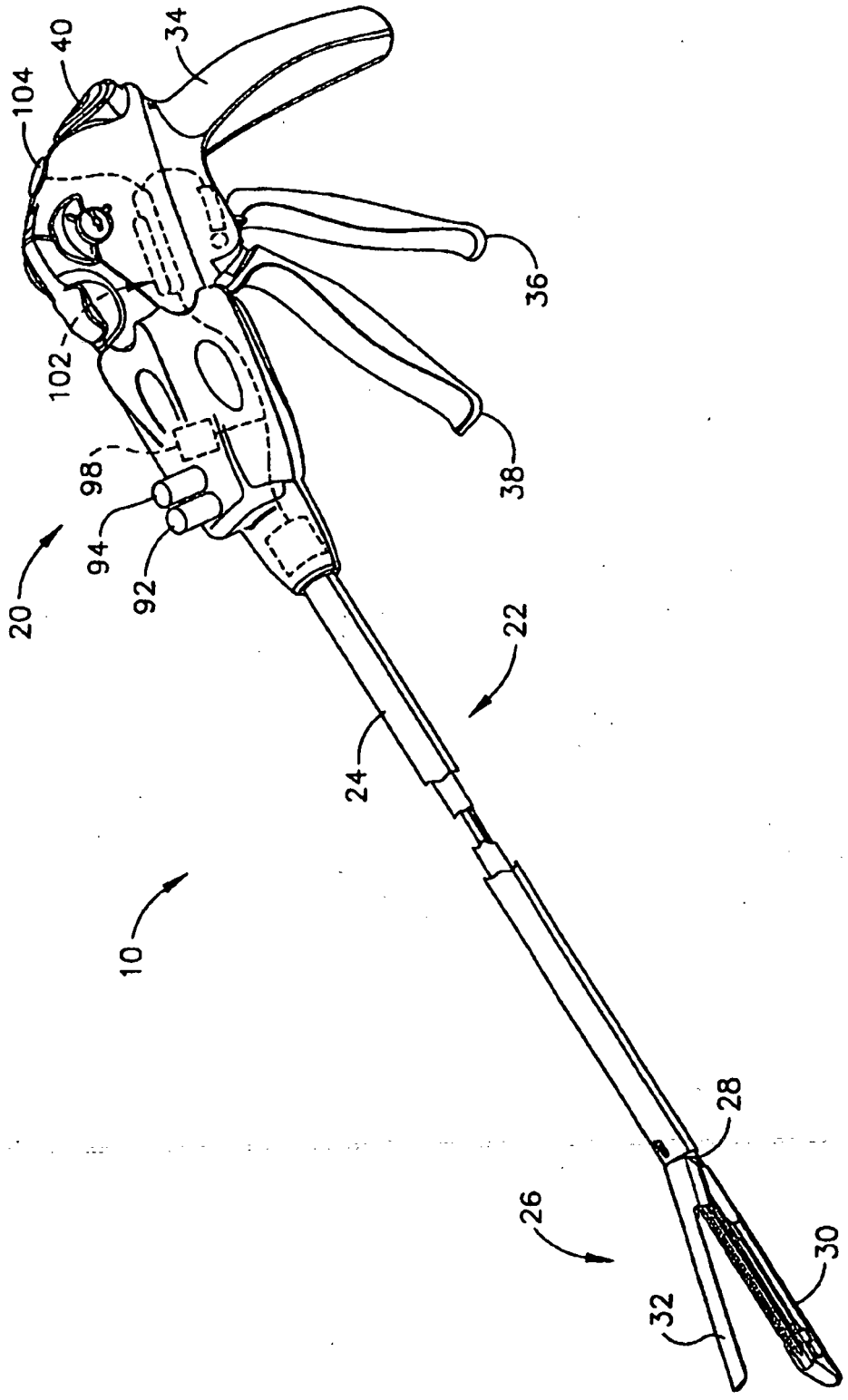

FIG. 1

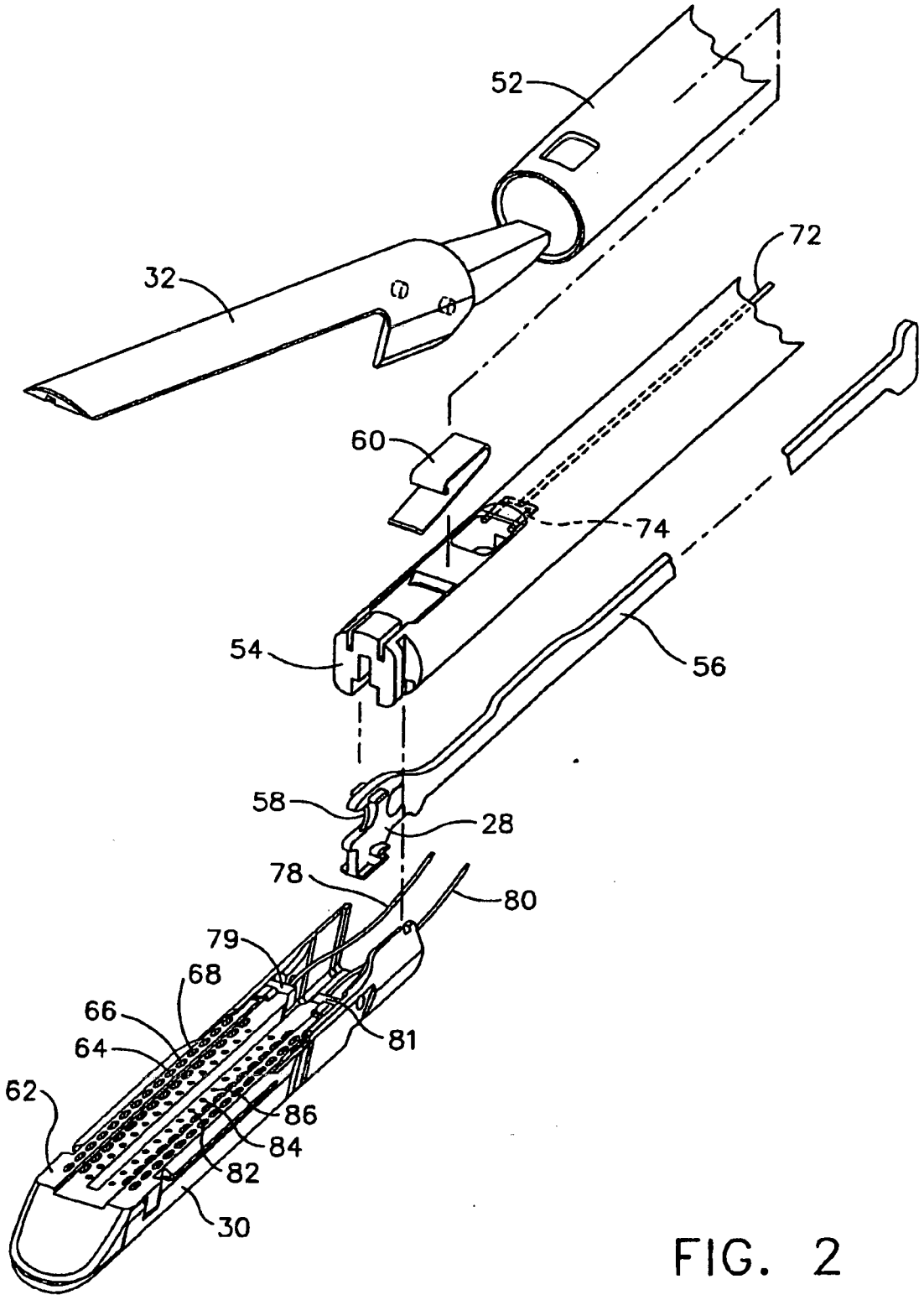

FIG. 2

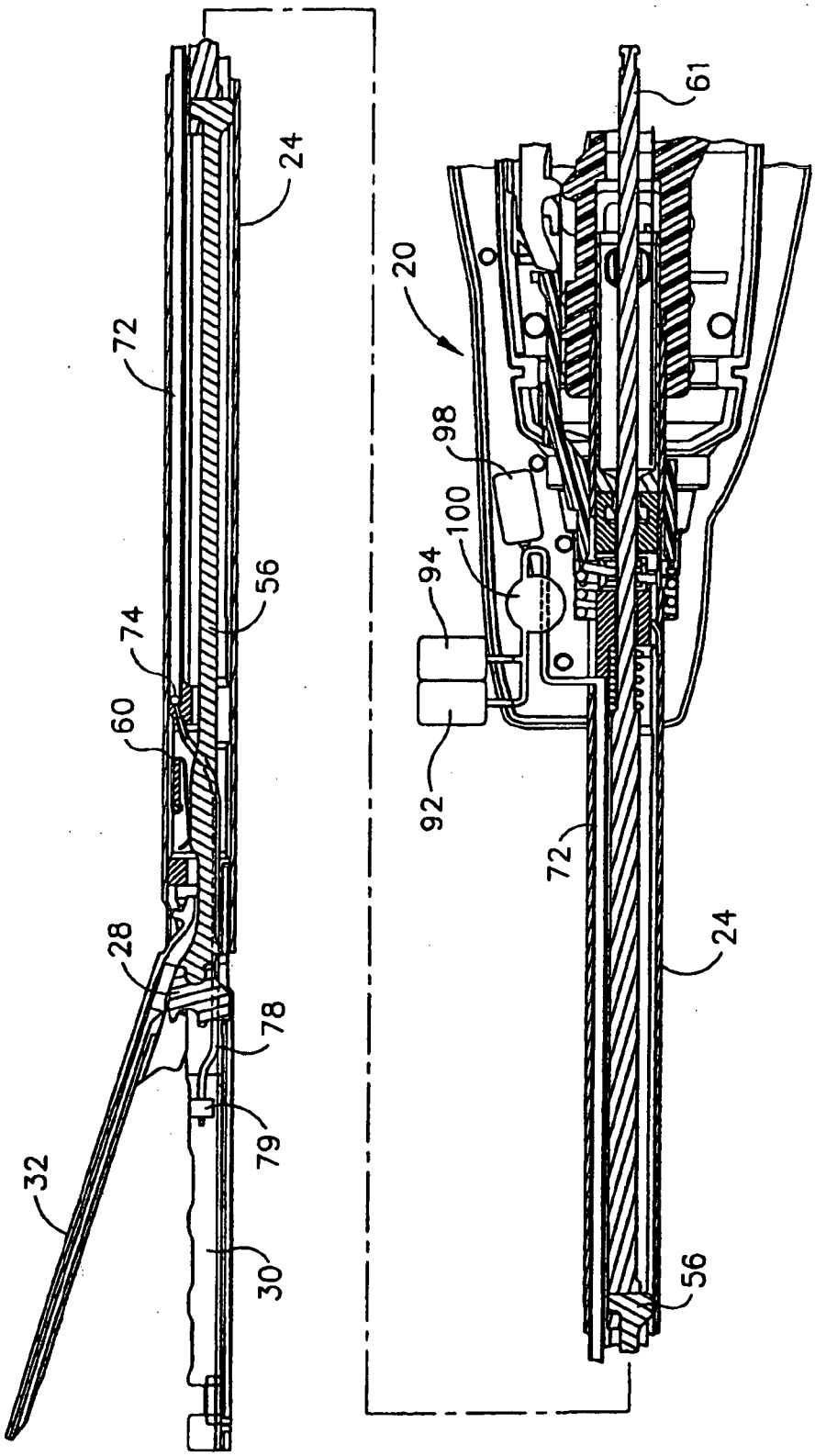

FIG. 3

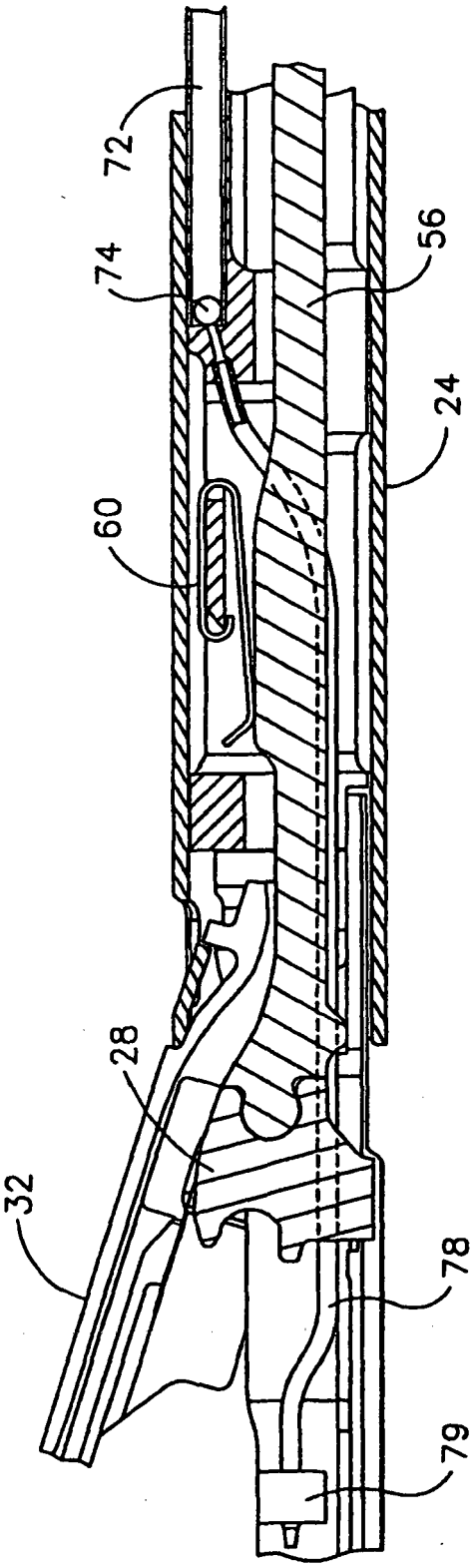

FIG. 4

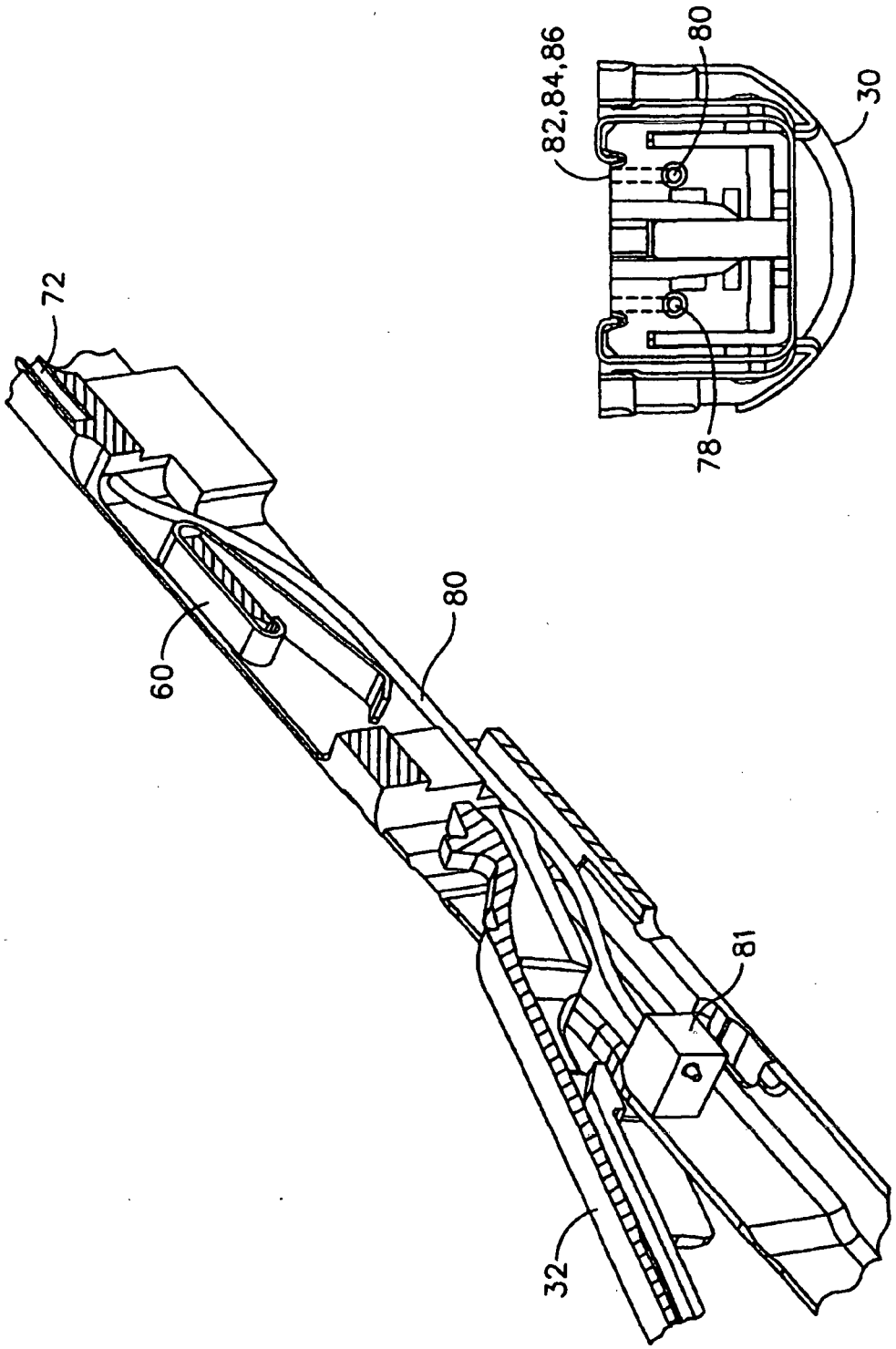

FIG. 5

FIG. 6

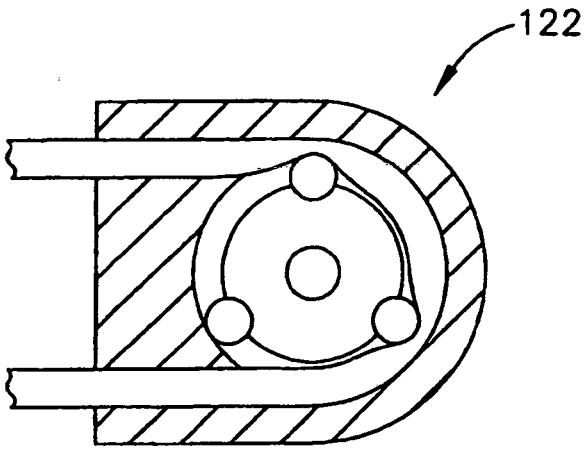

FIG. 7

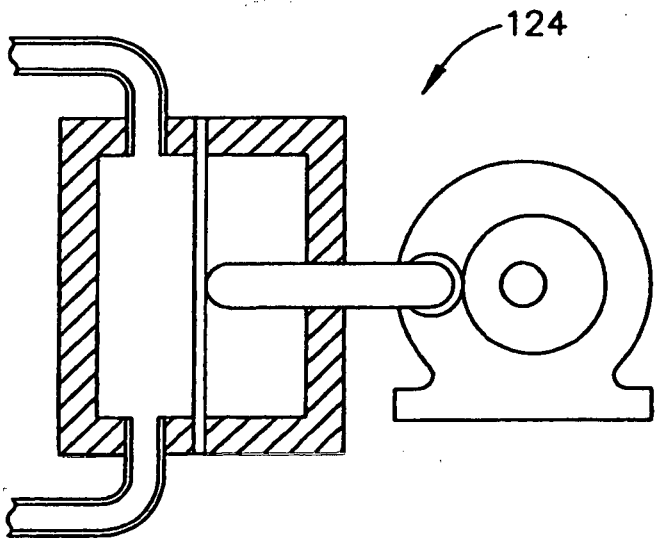

FIG. 8

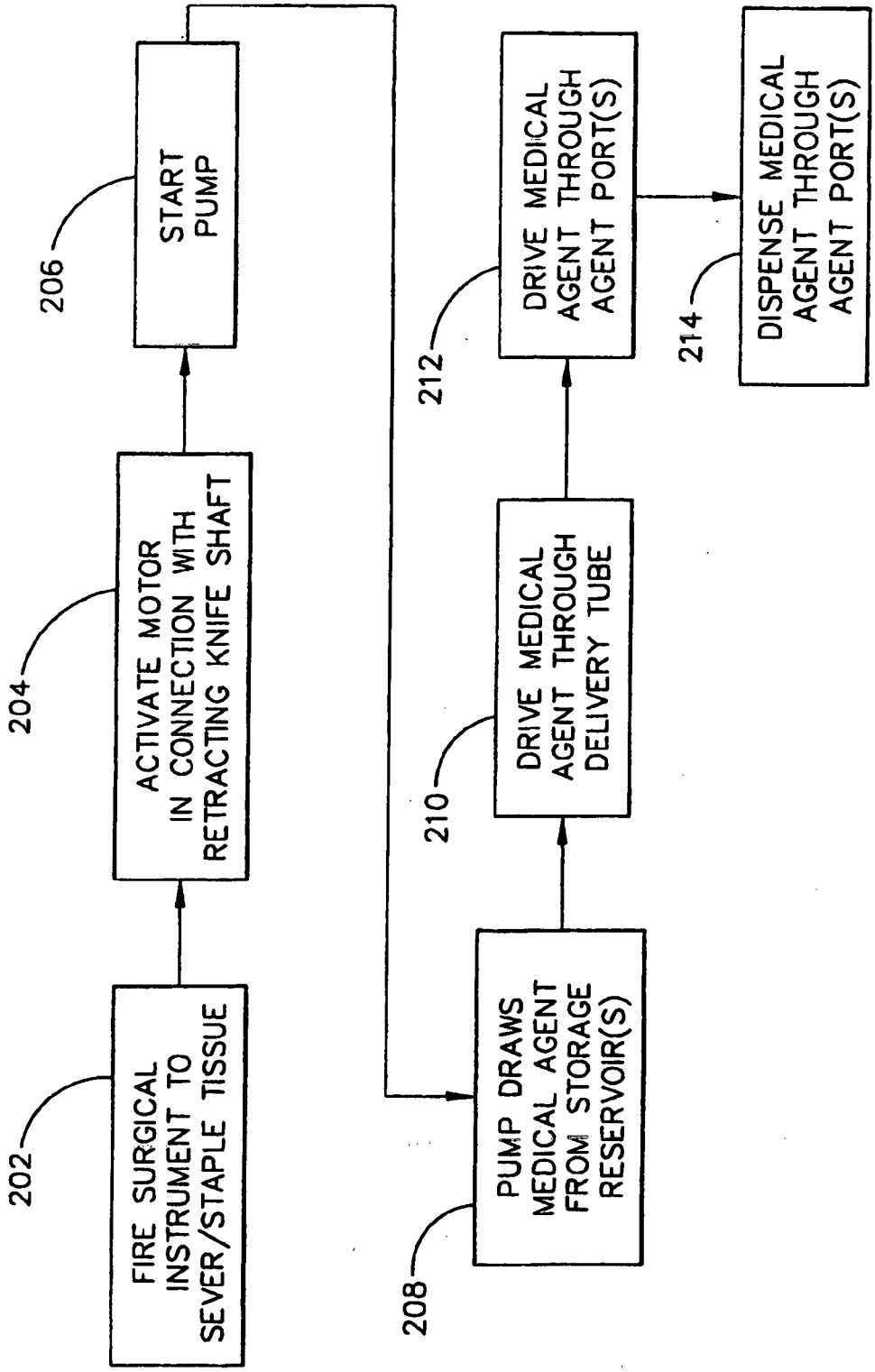
FIRE SURGICAL INSTRUMENT TO SEVER/STAPLE TISSUE
202
ACTIVATE MOTOR IN CONNECTION WITH RETRACTING KNIFE SHAFT
204
START PUMP
206
PUMP DRAWS MEDICAL AGENT FROM STORAGE RESERVOIR(S)
208
DRIVE MEDICAL AGENT THROUGH DELIVERY TUBE
210
DRIVE MEDICAL AGENT THROUGH AGENT PORT(S)
212
DISPENSE MEDICAL AGENT THROUGH AGENT PORT(S)
214

FIG. 9

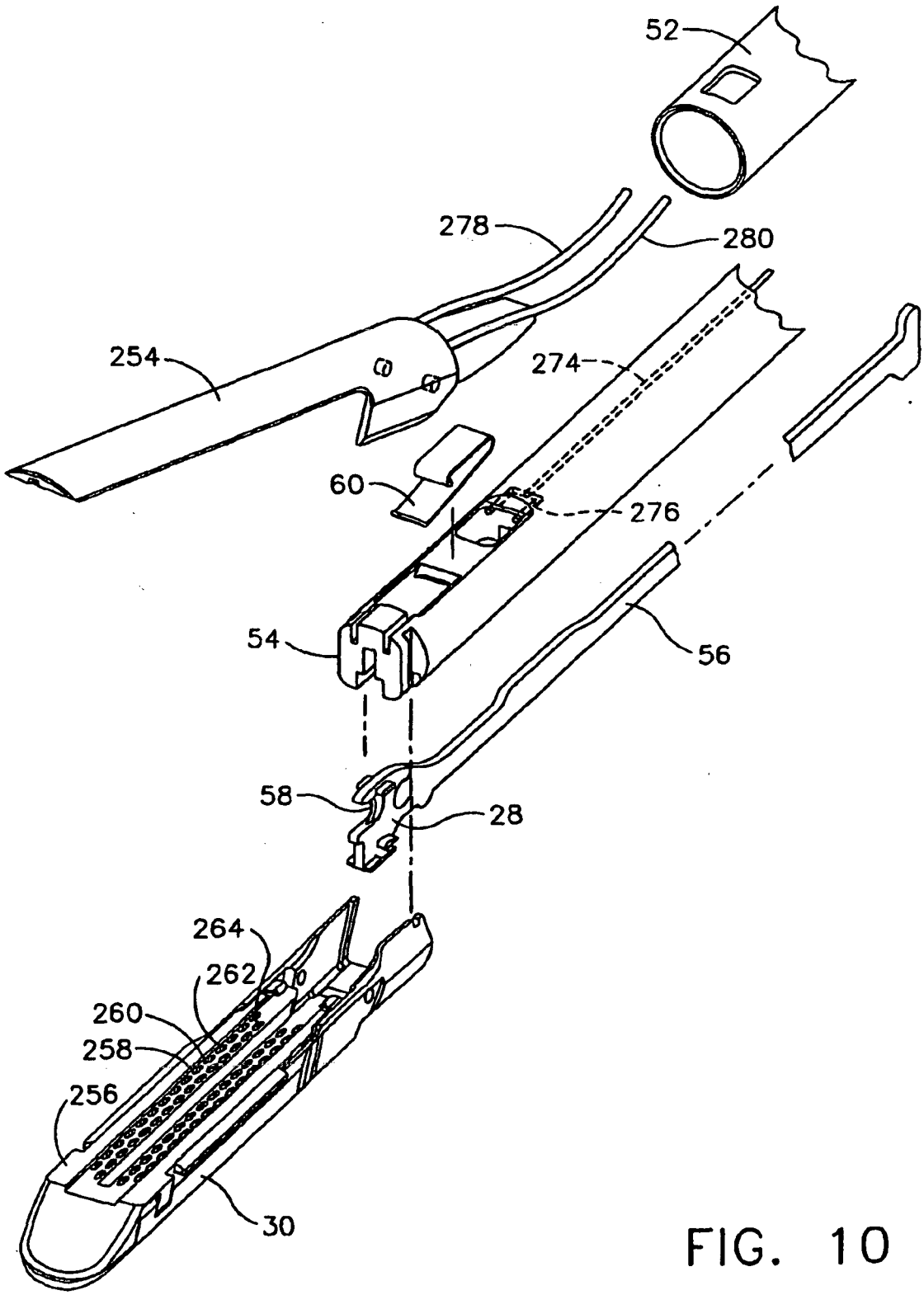

FIG. 10

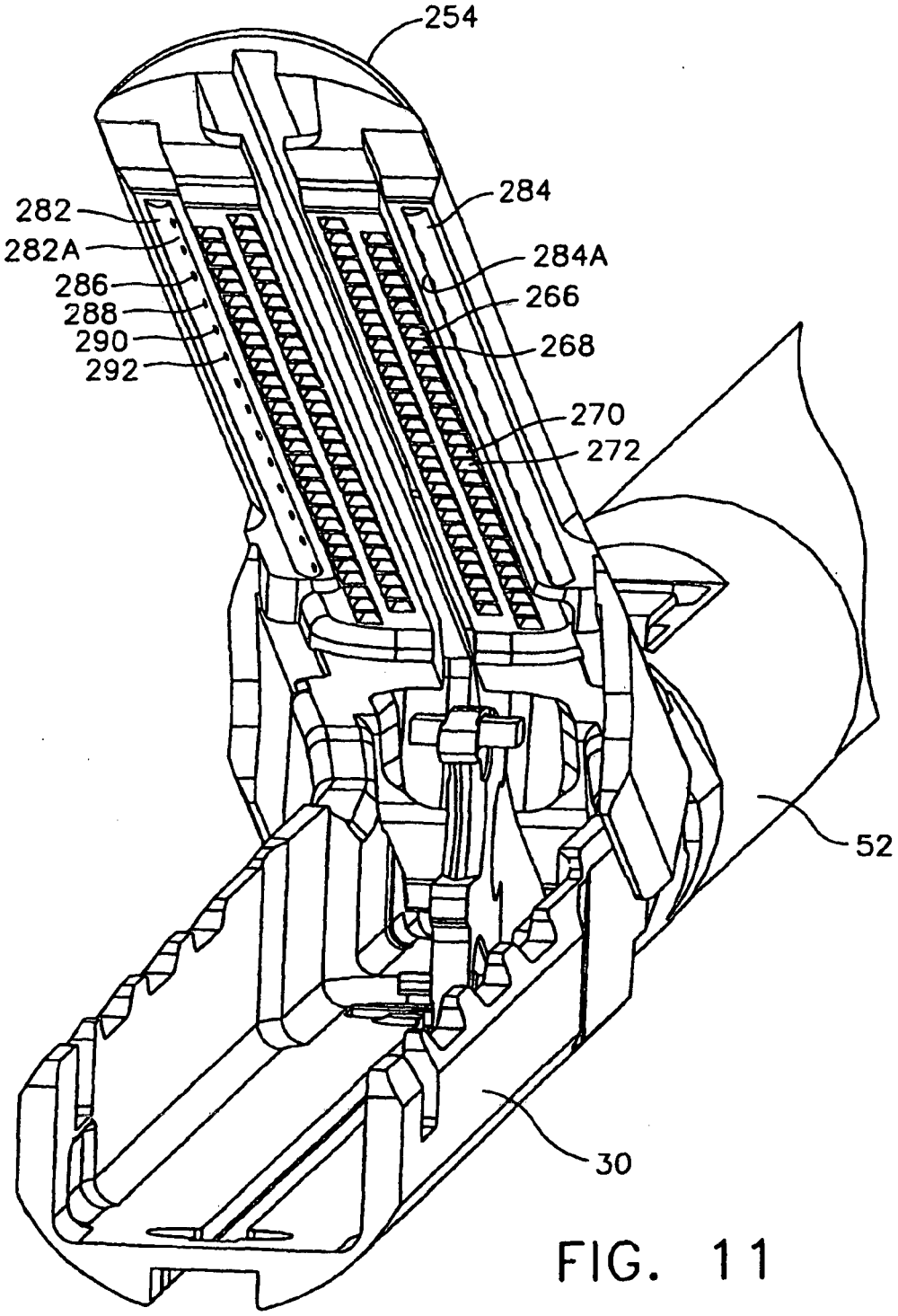

FIG. 11

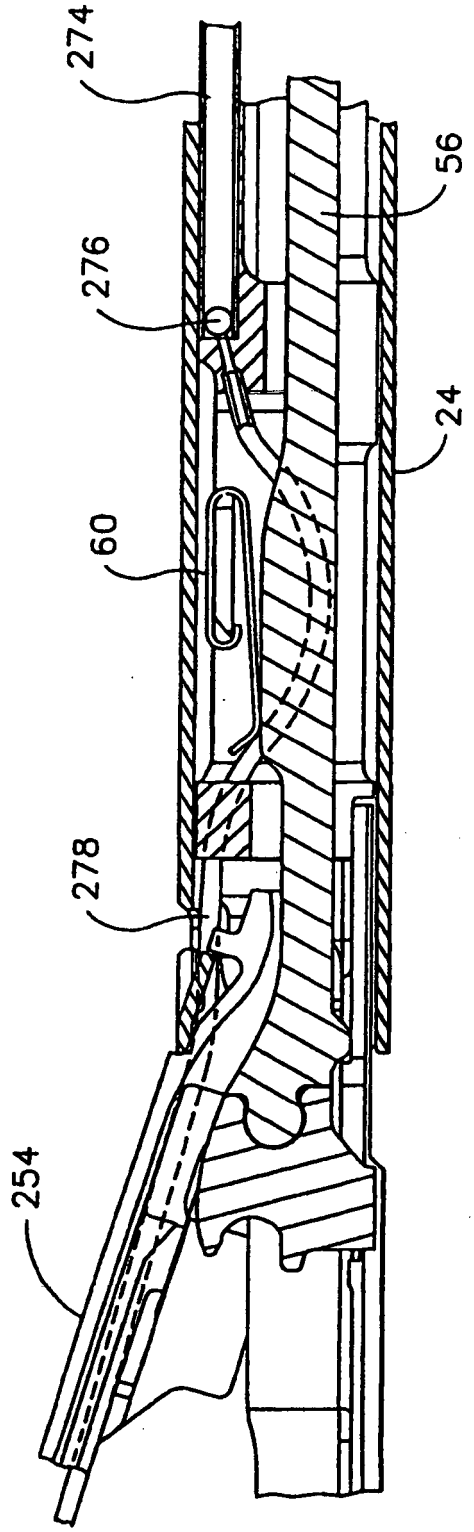

FIG. 12

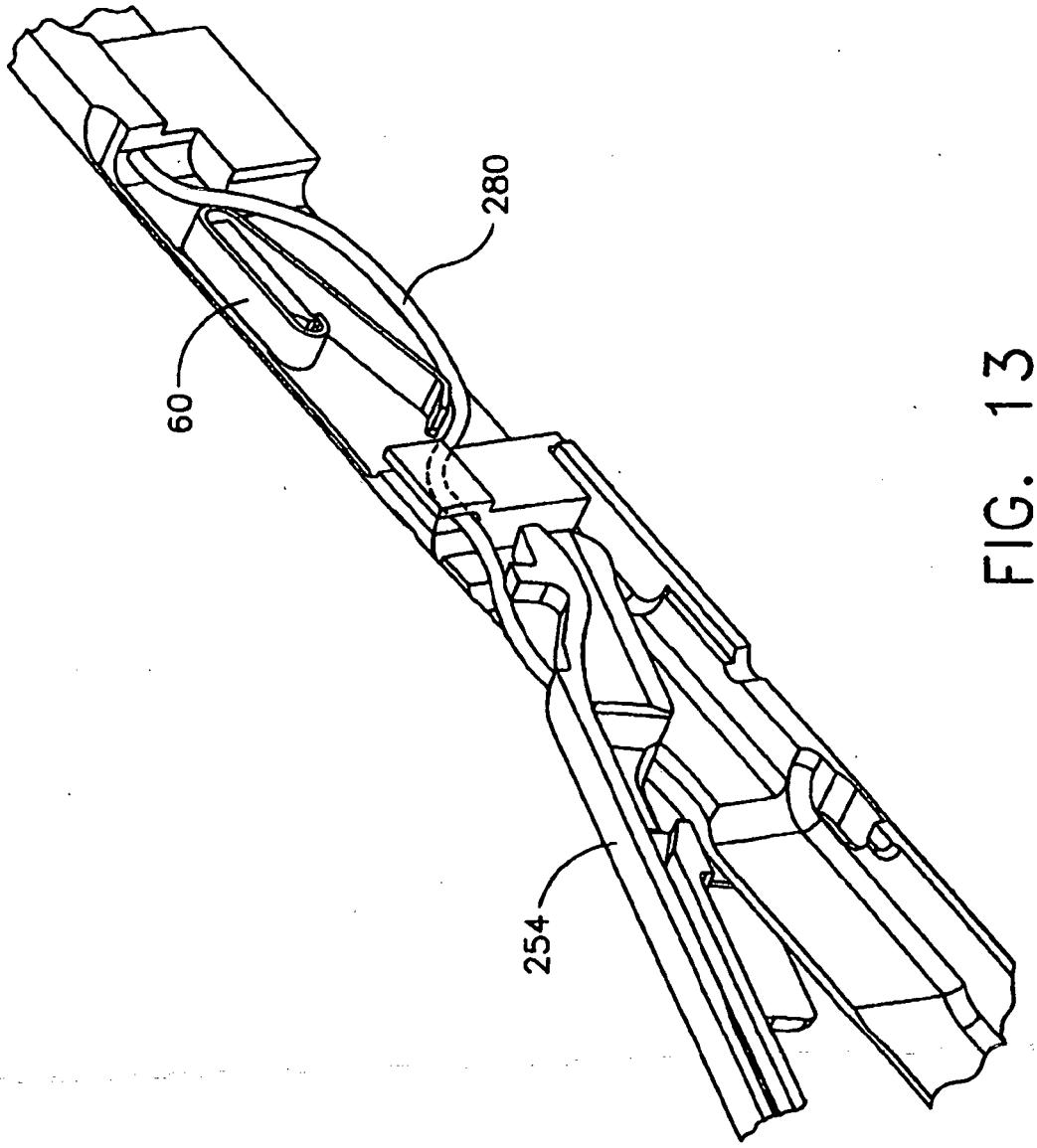

FIG. 13

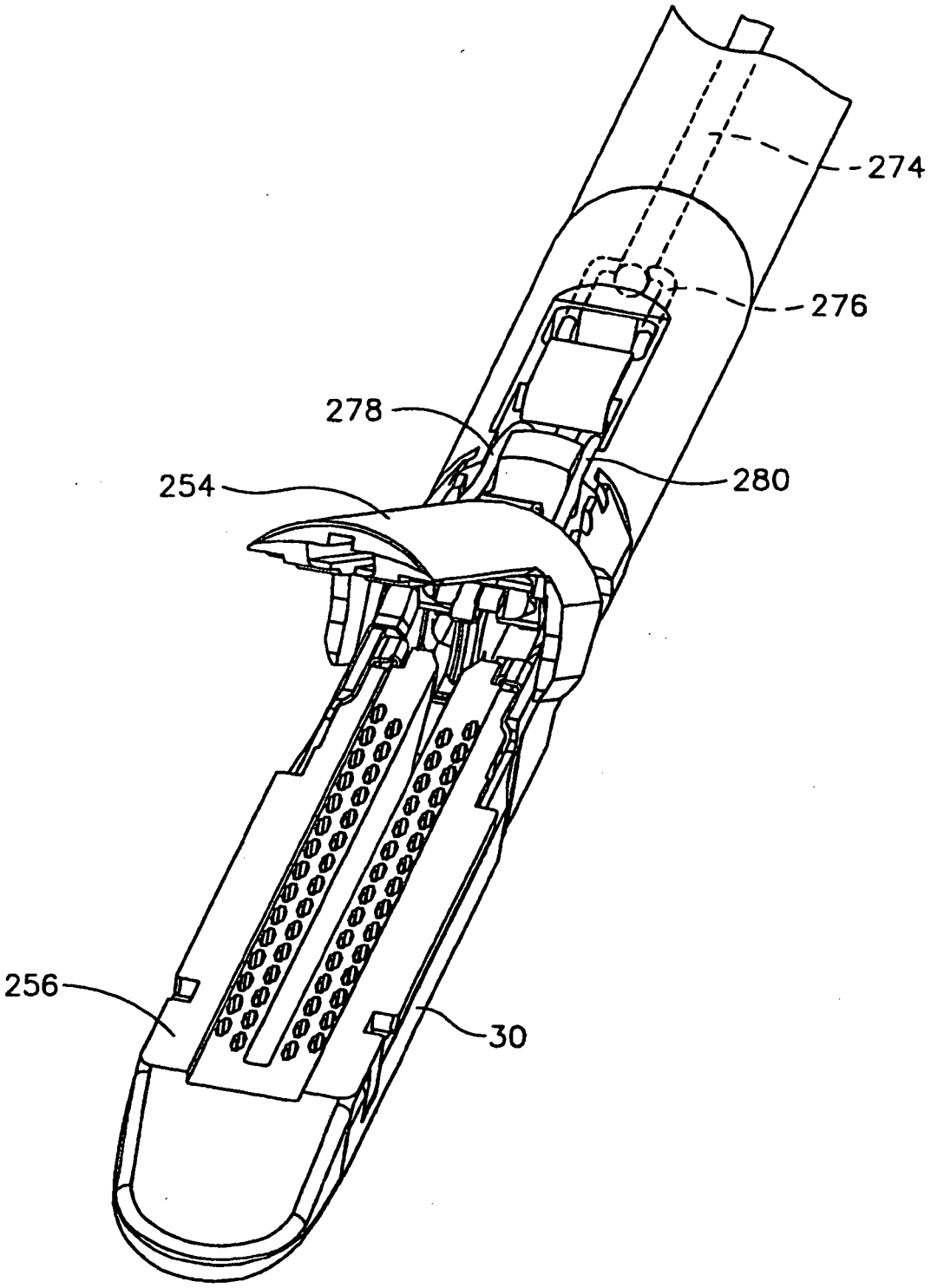

FIG. 14

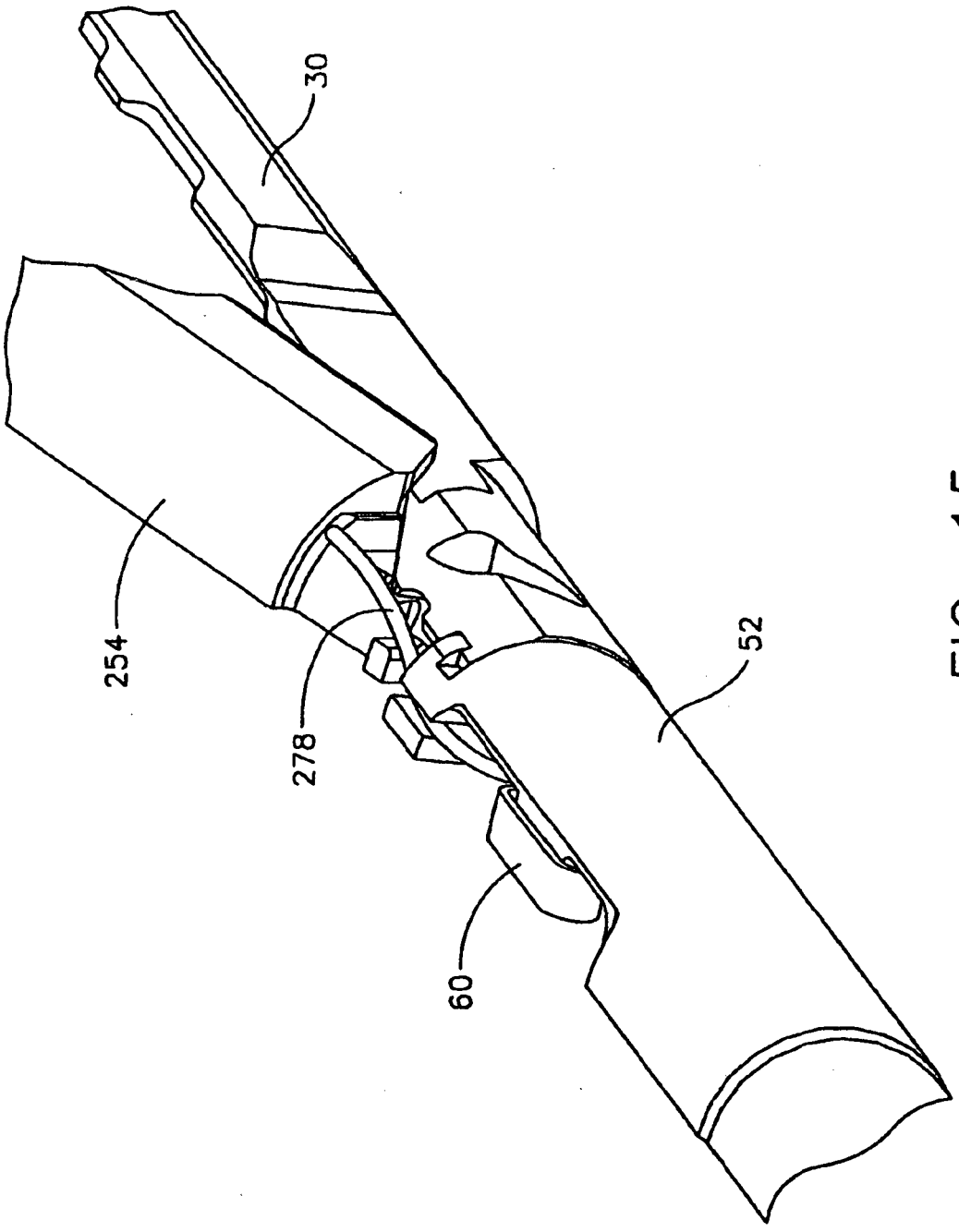

FIG. 15

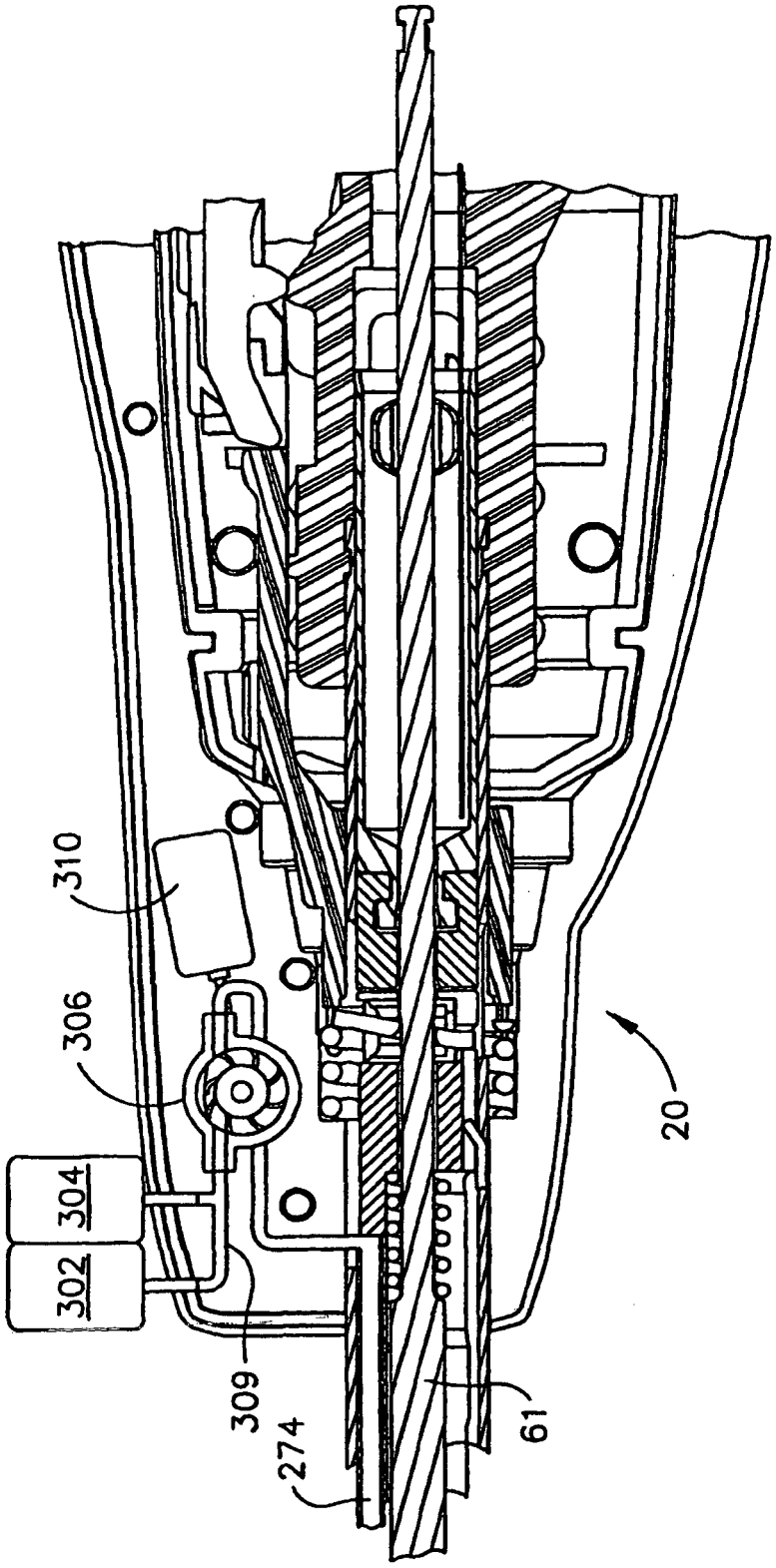

FIG. 16

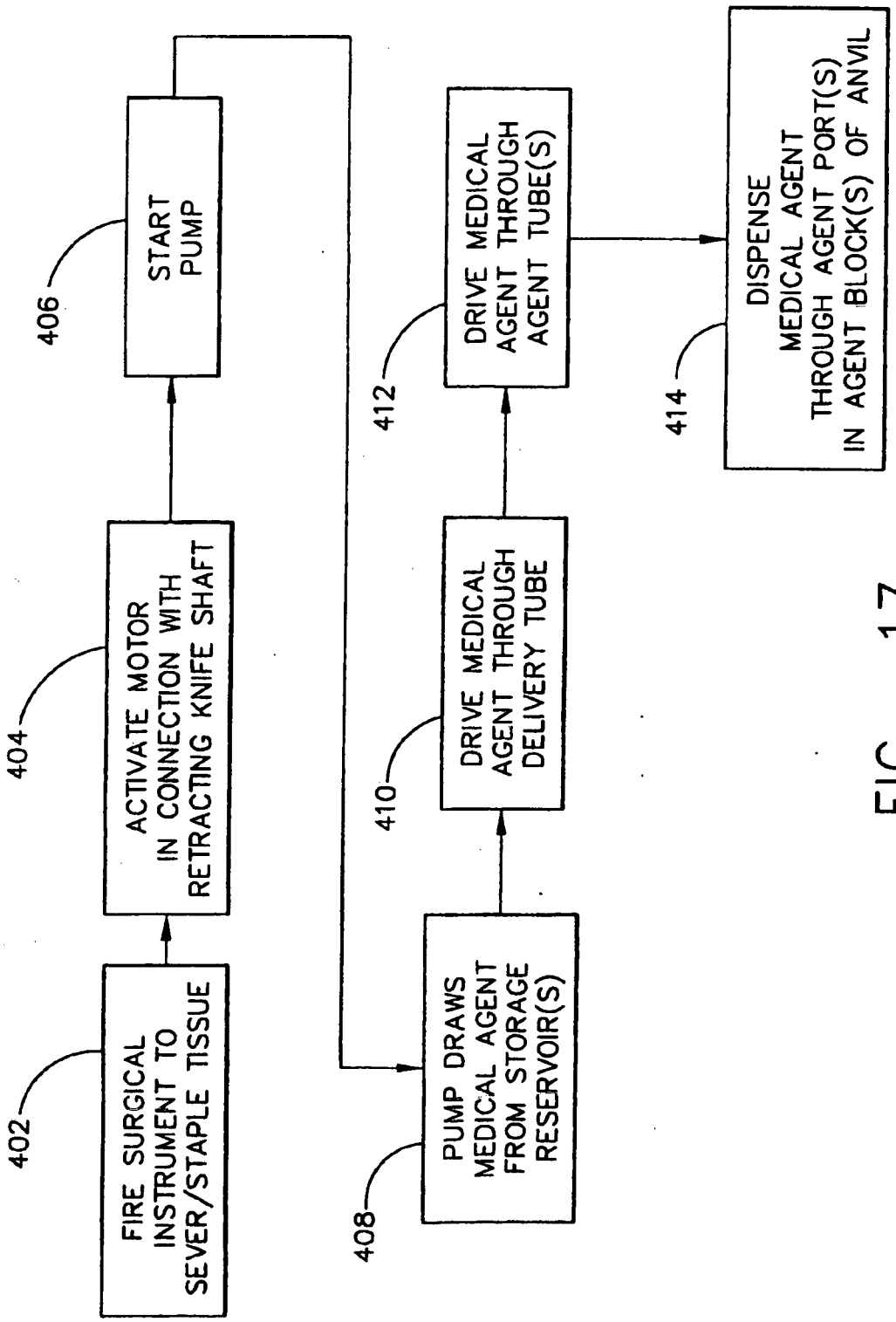
FIRE SURGICAL INSTRUMENT TO SEVER/STAPLE TISSUE
402
ACTIVATE MOTOR IN CONNECTION WITH RETRACTING KNIFE SHAFT
404
START PUMP
406
PUMP DRAWS MEDICAL AGENT FROM STORAGE RESERVOIR(S)
408
DRIVE MEDICAL AGENT THROUGH DELIVERY TUBE
410
DRIVE MEDICAL AGENT THROUGH AGENT TUBE(S)
412
DISPENSE MEDICAL AGENT THROUGH AGENT PORT(S) IN AGENT BLOCK(S) OF ANVIL
414

FIG. 17

REFERENCES CITED IN THE DESCRIPTION

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- US 20040232196 A1 **[0003]**
- US 20050230453 A1 **[0004]**
- WO 03088845 A **[0004]**
- US 20040232196 A **[0030]**

专利名称(译)	外科缝合器械，用于输送医疗器械		
公开(公告)号	EP1782739B2	公开(公告)日	2014-03-05
申请号	EP2006255675	申请日	2006-11-03
[标]申请(专利权)人(译)	伊西康内外科公司		
申请(专利权)人(译)	爱惜康内镜手术，INC.		
当前申请(专利权)人(译)	爱惜康内镜手术，INC.		
[标]发明人	SHELTON IV FREDERICK E MORGAN JEROME R		
发明人	SHELTON IV., FREDERICK E. MORGAN, JEROME R.		
IPC分类号	A61B17/072 A61M5/00 B67D7/06		
CPC分类号	A61B17/07207 A61B17/07292 A61B2017/00495 A61B2017/00893 A61B2017/07214		
优先权	11/267383 2005-11-04 US		
其他公开文献	EP1782739A1 EP1782739B1		
外部链接	Espacenet		

摘要(译)

提供了一种使用药剂分配系统的药剂分配系统和手术器械。分配系统可以构造成与外科切断/缝合器械一起使用，该外科切断/缝合器械构造成用于切断和缝合组织。所述分配系统可包括至少一个储存容器，所述储存容器构造成用于存储医疗代理的至少一个部件和与所述储存容器连通的泵;与泵连通的输送管，其构造成在泵的操作期间从储存容器接收一定量的药剂;至少一个与输送管连通的药剂管，其构造成与形成在钉仓或手术器械的砧座中的至少一个药剂端口连通，用于通过其分配药剂。

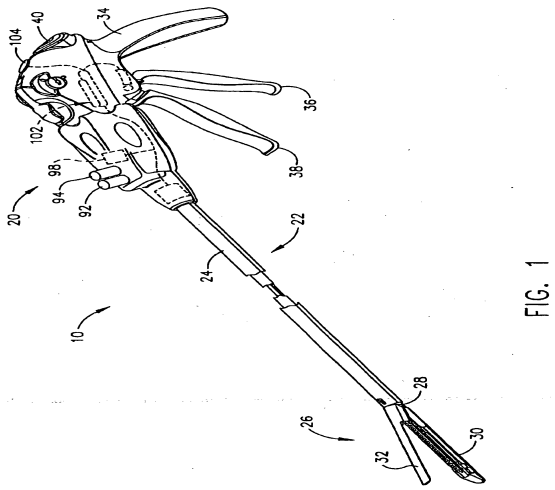

FIG. 1