

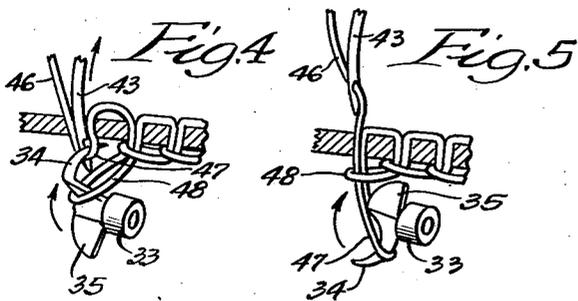
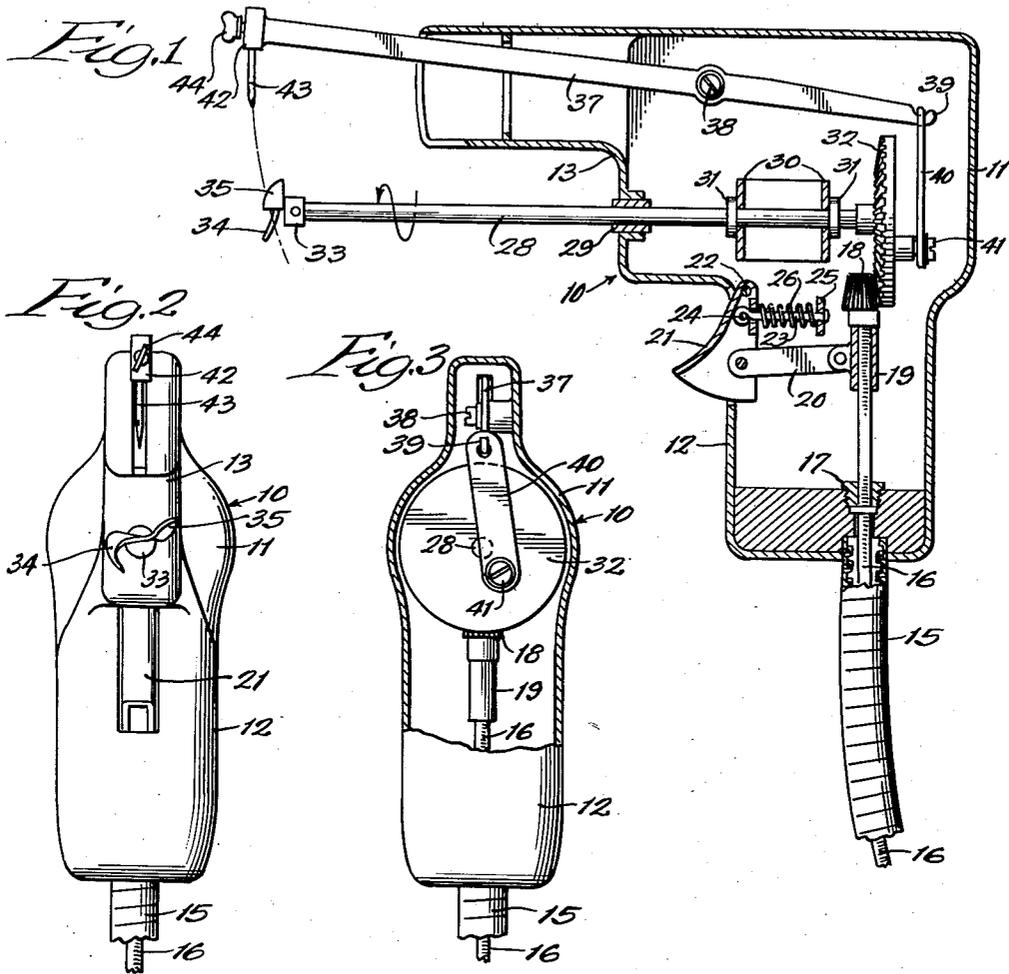
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SURGICAL SUTURING DEVICE

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SURGICAL SUTURING DEVICE

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4 Claims. (Cl. 112-169)

1 This invention relates to surgical suturing devices.

The principal object of this invention is to provide an improved surgical suturing device which semi-automatically sutures for cutting operating time by substantially one-third and work by substantially one-half, which is power driven and yet easily controlled, which is compact and light and so shaped to permit ready and easy manual manipulation thereof, which may be readily and easily manipulated with one hand, which may be readily sterilized, and which may be inexpensively manufactured.

Further objects of this invention reside in the details of construction of the suturing device and the cooperative relationship between the component parts thereof.

Other objects and advantages of this invention will become apparent to those skilled in the art upon reference to the accompanying specification, claims, and drawing in which:

Figure 1 is a sectional view of the surgical suturing device;

Figure 2 is an end elevational view thereof looking from the left of Fig. 1;

Figure 3 is a partial sectional view thereof looking from the right in Fig. 1;

Figures 4 and 5 are diagrammatic views illustrating the suturing operation accomplished by the device of this invention.

The surgical suturing device is generally designated at 10 and includes a housing or casing 11 provided with a pistol grip portion 12 and a muzzle portion 13.

A flexible drive shaft having a stationary flexible sleeve 15 and a rotatable flexible shaft 16 located therein enters the housing at the end of the pistol grip portion 12 thereof. The stationary sleeve 15 is suitably secured to the housing and the rotatable flexible shaft 16 extends through a suitable bearing 17 in the housing. The rotatable flexible shaft 16 as preferably rotated by a power source (not shown) such as a motor or the like. The inner end of the flexible drive shaft 16 carries a pinion 18. The drive shaft 16 adjacent the pinion 18 is journaled in a sleeve 19 carried by a link 20 pivoted to a trigger 21 which in turn is pivoted to the housing 11 by pivot pin 22. One end of a link 23 hooks over a pin 24 in the trigger 21 and the other end extends through a hole in a stationary abutment 25 carried by the housing. A spring 26 surrounds the link 23 and is interpositioned between the trigger 21 and the abutment 25 for urging the trigger 21 outwardly for normally pulling the

2 pinion 18 to the left. When the trigger 21 is moved inwardly against the spring 26 the pinion 18 is moved to the right, thus, a control trigger mechanism entering the housing adjacent the pistol grip and muzzle portions thereof is provided for positioning the drive pinion 18.

A looper shaft 28 extends into the muzzle portion of the housing and is journaled in bearings 29 and 30 carried by the housing. A pair of collars 31 on the shaft 28 prevent longitudinal movement of the shaft, but at the same time permit rotation thereof. The inner end of the shaft 28 is provided with a gear 32 adapted to be engaged by the pinion 18. The outer end of the looper shaft 28 is provided with a looper 33 having a hook 34 and a guide vane 35. When the trigger 21 is depressed the pinion 18 engages the gear 32 for rotating the looper shaft 28 and the looper 33 and when the trigger 21 is released the pinion 18 disengages the gear 32 and rotation of the shaft 28 and looper 33 is stopped.

A needle arm 37 enters the muzzle portion of the housing 11 and is pivoted intermediate its ends on a pivot pin 38 within the housing 11. The inner end of the needle arm is provided with a hook 39 carrying one end of a link 40, the other end being carried by a pivot pin 41, carried by the gear 32. Thus, as the gear 32 is rotated, oscillatory movement is imparted to the needle arm 37 through the link 40. The needle arm 37, therefore, oscillates about its pivot 38 in timed relation with the rotation of the looper shaft 28. The needle arm 37 is substantially parallel to the looper shaft 28.

The outer end of the needle arm 37 is provided with means for supporting or carrying a needle 43. In this respect the needle 43 is held in the enlarged end 42 of the needle arm by a suitable screw 44. Preferably, the parts of the suturing device are made of non-corrosive metal so that the device may be readily sterilized.

The eye of the needle 43 carries a suitable suturing thread 46. The looper 33 is so arranged on the looper shaft 28 that the hook 34 is adjacent the needle 43 when the needle is advanced as illustrated in Fig. 4 and is away from the needle when the needle is retracted as illustrated in Fig. 5.

The needle 43 may be of the cutting or round edge type. The suture material or thread may be readily changed merely by changing the needle carrying the thread. For example, chronic cat gut, plain cat gut, cotton, silk or any other suture material is usable.

In the use of the surgical suturing device the

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flexible drive shaft 16 is rotated and the pistol portion 12 of the device is grasped, the trigger 21 is depressed to cause rotation of the looper shaft 28 and oscillation of the needle arm 37, the needle 43 carrying with it the suturing thread 46 pierces the tissue to be sutured and the hook 34 of the looper 33 forms a loop 47 as illustrated in Fig. 4. Continued rotation of the looper 33 causes the hook 34 to carry the loop 47 through the previously formed loop 48 as shown in Fig. 5. In so doing the vane 35 engages the loop 47 to hold it in proper position ready for the next cycle of operation. The surgical suturing device can be operated in the foregoing manner to provide separate individual stitches whereby it can be used to stitch inside the pelvis, abdomen, vagina, etc. If desired, the suturing device may be operated through a number of cycles of operation to provide a continuous stitching action which would be particularly useful in closing procedures through the peritoneum, shin and the like. In the latter case a chain stitch would be provided.

The surgical suturing device of this invention, therefore, semi-automatically sutures and reduces the operating time by substantially one-third and the work by substantially one-half. Since the suture device is power driven only one hand is required for operating the device whereby the other hand is left free for positioning the tissue during the suturing operation. The pistol grip portion of the housing provides ready means for grasping the suturing device so that it may be easily and accurately used. The suturing device is light in weight and compact in construction thereby greatly facilitating the use thereof. The device may be readily sterilized because of its simple construction. It may also be inexpensively manufactured so that it may be readily accessible to the medical profession.

While for purposes of illustration one form of this invention has been disclosed, other forms thereof may become apparent to those skilled in the art upon reference to the accompanying specification and drawing, and therefore, this invention is to be limited only by the scope of the appended claims.

I claim:

1. A surgical suturing device comprising a housing, a flexible drive shaft entering the housing and provided with a pinion at its inner end, a rotary looper shaft entering the housing and provided with a looper at its outer end and a gear at its inner end, a control trigger mechanism entering the housing for engaging and disengaging the pinion and gear for controlling rotation of the gear and looper shaft, a needle arm substantially parallel to the rotary looper shaft and entering the housing and pivoted for oscillatory movement toward and away from the looper shaft and provided with means at its outer end for supporting a needle, and a connection between the gear and the inner end of the needle arm for oscillating the latter in timed relation to the rotation of the looper shaft.

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2. A surgical suturing device comprising a power driven drive shaft provided with a driving pinion, a rotary looper shaft provided with a looper and a gear, a control mechanism for engaging and disengaging the pinion and the gear for controlling rotation of the gear and looper shaft, a needle arm substantially parallel to the looper shaft and pivoted for oscillatory movement toward and away from the looper shaft and having means for supporting a needle adjacent the looper, and a connection between the gear and needle arm for oscillating the latter in timed relation to the rotation of the looper shaft.

3. A surgical suturing device comprising a housing having a pistol grip portion and a muzzle portion, a flexible drive shaft entering the pistol grip portion of the housing, a rotary looper shaft entering the muzzle portion of the housing and provided with a looper at its outer end, an oscillatory needle arm entering the muzzle portion of the housing substantially parallel to the looper shaft and provided with means at its outer end for supporting a needle in operative relation to the looper, driving connections in the housing between the drive shaft, looper shaft and needle arm for oscillating the needle arm and for rotating the looper shaft in timed relation, and a control mechanism including a trigger entering the housing adjacent the muzzle and pistol grip portions thereof for controlling the driving connections.

4. A surgical suturing device comprising a housing having a pistol grip portion and a muzzle portion, a flexible drive shaft entering the pistol grip portion and provided with a pinion at its inner end, a rotary looper shaft entering the muzzle portion of the housing and provided with a looper at its outer end and a gear at its inner end, a control trigger mechanism entering the housing adjacent the muzzle and pistol grip portions thereof for engaging and disengaging the pinion and gear for controlling rotation of the gear and looper shaft, a needle arm entering the muzzle portion of the housing substantially parallel to the looper shaft and pivoted for oscillatory movement toward and away from the looper shaft and provided with means at its outer end for supporting a needle, and a connection between the gear and the inner end of the needle arm for oscillating the latter in timed relation to the rotation of the looper shaft.

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