

July 1, 1969

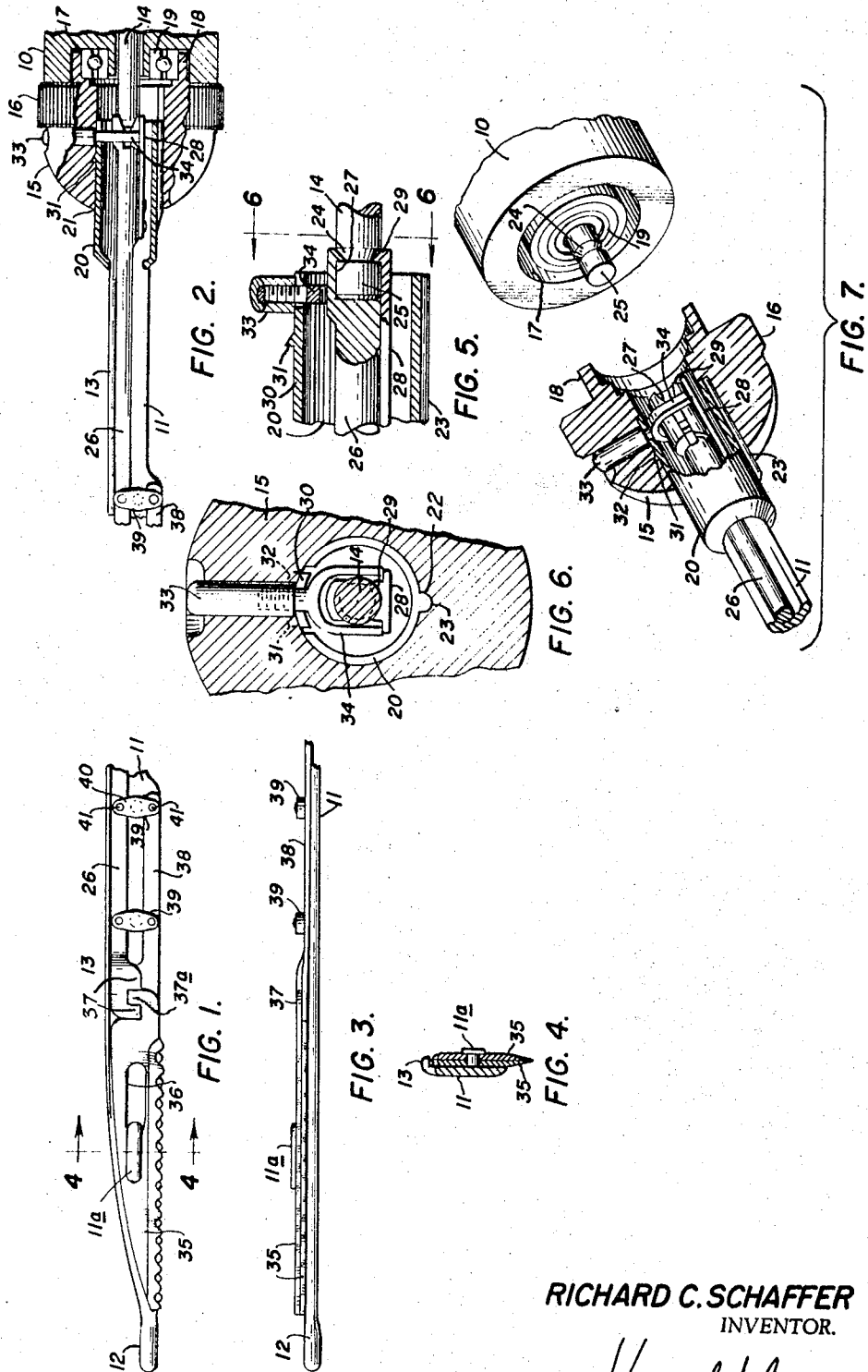
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3,452,741

CONETOME

Filed May 27, 1966

Sheet 1 of 2



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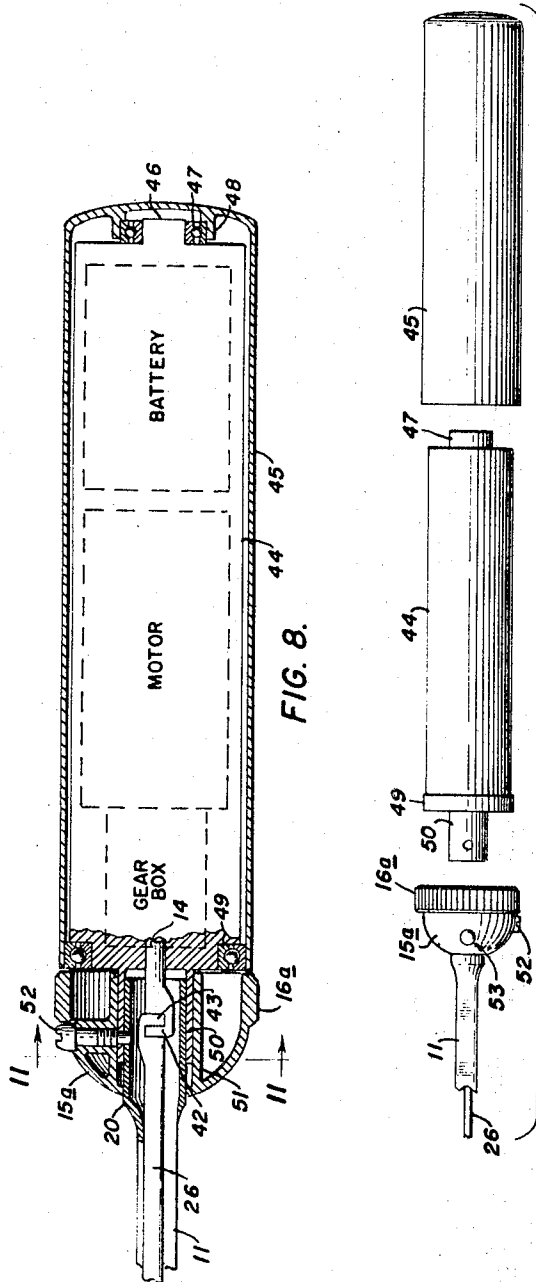


FIG. 8.

FIG. 9.

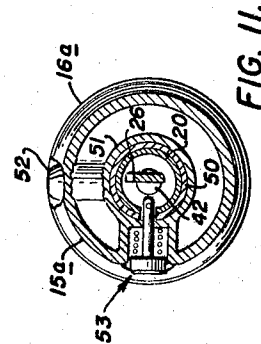


FIG. 10.

FIG. 11.

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3,452,741
CONETOME

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Continuation-in-part of application Ser. No. 488,318,
Sept. 20, 1965. This application May 27, 1966, Ser.
No. 553,395

Int. Cl. A61b 10/00, 17/32; B26b 7/00

U.S. Cl. 128—2

5 Claims

ABSTRACT OF THE DISCLOSURE

A conetome for taking biopsies from the cervix for curative or diagnostic purposes and consisting of a handle, power means carried by the handle, an elongate frame extending from the handle, a pair of reciprocating scalpel blades in side by side relation on the frame and a knob on the distal end of the frame for insertion in cervical canal for locating the instrument when cutting a cone shaped biopsy.

This application is a continuation in part of my copending application, Ser. No. 488,318, filed Sept. 20, 1965, now abandoned.

This invention relates to surgical instruments and has reference to conetomes for taking cone shaped biopsies from the cervix for curative or diagnostic purposes.

The usual procedure for obtaining such specimen is by use of a simple scalpel blade and handle, the results of which are quite often unsatisfactory. Ideally, a single specimen of biopsy tissue consists of a cone shaped mass with a portion of the cervical canal running through the center. Quite often the biopsy material is received by the pathologist in several irregular pieces making it difficult to orient them as to where a cancer might be in relation to the circumference of the cervix and as to how deep the cancer may be invading the substance of the cervix. These factors are very important as far as treatment of a cancer of the cervix is concerned and, therefore, it is important to know where and how deep a cancer of the cervix is located.

Generally, the conetome of my referred to copending application consists of a handle, power means carried by the handle, an elongate frame extending from the handle, a pair of scalpel blades in side by side relation on the frame and a knob on the distal end of the frame for insertion in the cervical canal for locating the instrument when cutting a cone shaped biopsy. In this first form of the invention it was necessary to rotate the entire instrument as the handle was moved in a 360° orbital path. While this could be done it proved to be somewhat awkward. The present invention is directed to a conetome including the features of my copending application and additionally includes means for rotating the scalpel blades without rotating the handle as the latter is moved in its orbital path.

The primary object of the invention is to provide an instrument for quickly and easily procuring a cone shaped biopsy of the cervix.

A particular object of the invention is to provide an instrument for the described purpose, which instrument will eliminate unnecessary cuts and at the same time provide smooth and regularly shaped specimens.

A further object is to provide a conetome having reciprocating serrated scalpel blades for smoothly and rapidly cutting the necessary tissue, together with a knob which fits into the cervical canal and whereby the conical cut may be made around a definite center location.

A further object of the invention is to provide a conetome having a reciprocating blade assembly driven by a motor in the handle, and which assembly may be separated from the handle for cleaning and sterilizing.

Another object is to provide means whereby the blades of a conetome may be rotated about the axis of the handle when taking a conical biopsy.

A further object, complementary to the last stated object, is to provide a conetome construction wherein all exposed parts may be sterilized.

These and other objects of the invention will become apparent from the following description and the accompanying drawings, wherein:

FIGURE 1 is a fragmentary side elevational view of the distal end of a conetome according to my invention.

FIGURE 2 is a fragmentary side elevational and sectional view of the proximal end of the scalpel supporting frame rotatably received in the forward handle portion of the conetome.

FIGURE 3 is a bottom plan view of FIGURE 1.

FIGURE 4 is a sectional view taken on line 4—4 of FIGURE 1.

FIGURE 5 is a longitudinal enlarged fragmentary sectional view showing the demountable connection between the drive shaft and driven shaft.

FIGURE 6 is a further enlarged sectional view taken on line 6—6 of FIGURE 5.

FIGURE 7 is an exploded perspective and sectional view of the components illustrated in FIGURES 2 and 5.

FIGURE 8 is a fragmentary longitudinal sectional view of a modified form of the invention.

FIGURE 9 is an exploded elevational view of the components illustrated in FIGURE 8.

FIGURE 10 is a longitudinal sectional view of the cap or closure and parts therein illustrated in FIGURES 8 and 9 and taken at 90° with reference to FIGURE 8, and

FIGURE 11 is a sectional view taken on line 11—11 of FIGURE 8.

The form of the invention illustrated in FIGURES 1 through 7 includes a handle 10, an elongate generally flat frame 11 which is curved downwardly at its outer end where it has a projecting knob 12. An integral laterally projecting back 13 extending nearly the length of the frame 11 lends rigidity to the latter.

Within the handle 10 there is an electric motor and gear mechanism, not shown in FIGURES 1—7, but to be referred to in connection with FIGURES 8—11, which motor and mechanism impart longitudinal reciprocating movement to a centrally located drive shaft 14 within the handle. Rotatably mounted on the forward end of the handle 10 there is a closure 15 which is serrated, at 16, around its periphery. The forward end of the handle 10 has an annular recess 17 which receives a collar 18 on the rear of the closure 15, and within the collar there is an anti-friction bearing 19. The outer race of the bearing 19 is a press fit in the collar 18, whereas the inner race is a slip fit on the inner wall of the annular recess 17.

On the inner end of the frame 11 there is a hollow cylindrical member 20 which is slidably received in an axial opening 21 in the closure 15. To prevent relative rotation, there is a longitudinal groove 22 in the axial opening 21 which receives a key 23 on the cylindrical member 20.

As best shown in FIGURE 5, around the forward end of the reciprocating drive shaft 14 there is a beveled groove 24 providing a head 25 which is detachably engaged by the inner end of a driven shaft 26 mounted on the frame 11. The upper half of the inner end of the driven shaft 26, which is round at this end, is recessed at 27 to receive the upper half of the drive shaft head 25. A leaf spring 28 having an upturned end 29 to engage the drive shaft groove 24 is attached to the bottom of the driven shaft 26.

As best shown in FIGURE 6, the top of the cylindrical member 20 is divided along each side of its center to its

end to provide a spring 30. A ridge 31 across the spring 30 is engaged in a transverse groove 32 in the axial opening 21 in the closure 15 for holding the frame 11 in place. Both the cylindrical member 20 and the driven shaft 26 are released by a push button 33 in the top of the closure 15 forwardly of the serrations 16. A fork 34 is threaded in the inner end of the button 22 and straddles the end of the driven shaft 26 where it contacts opposite sides of the leaf spring 28. The lower end of the push button 33, which is cylindrical, is in contact with the upper spring 30. Thus, by pressing the button 33, the ridge 31 on the spring 30 is disengaged from the groove 32 in the axial opening 21 and at the same time the leaf spring 28 is depressed, thereby moving the upturned end 29 of the leaf spring out of the drive shaft groove 24. While the button 33 is depressed, the driven shaft 26 is flexed upwardly, thus raising the recessed portion 27 of the shaft from the head 25. The frame 11 and all that it supports can then be pulled from the closure 15. While that portion of the driven shaft 26 received in the closure 15 is round, it is shown by shading in FIGURE 2 that this shaft becomes flat outwardly of the closure.

Referring again to the distal end of the frame 11, on one side thereof there is an elongate longitudinally disposed flanged guide 11a for supporting a pair of serrated scalpel blades 35 in side by side relation. As in common practice, the scalpel blades 35 are curved along their edges opposite their cutting edges, and have slots 36 for mounting the blades on a holder. In the present construction the slots 36 are used for slidably mounting the blades on the frame 11 by means of the guide 11a. It is to be noted that the serrated cutting edges of the blades 35 are parallel with and extend below the bottom edge of the frame 11.

As best shown in FIGURE 1, the driven shaft 26 is offset near its end where it has laterally extending fingers 37 which engage a corresponding lateral finger 37a on the rear end of the blade 35.

Parallel with the driven shaft 26 there is an auxiliary shaft 38 which extends along the bottom edge of the center portion of the frame 11. Rocker arms 39, pivotally mounted at their centers on the frame 11 by pins 40, have outer pivot pins 41 connected with the driven shaft 26 and the auxiliary shaft 38. The auxiliary shaft 38 and the blade 35 adjacent the frame 11 are connected by fingers, not shown, such as 37 and 37a. Thus, reciprocating motion from the drive shaft 14 imparts alternate reciprocating motion to the blades 35.

The form of the invention illustrated in FIGURES 8 through 11 has the same frame 11, cylindrical member 20, scalpel blades 35, knob 12, auxiliary shaft 38 and rocker arms 39. However, the drive shaft 14 and inner end of the driven shaft 26 are connected in alignment with each other by interfitting coupler members 42 and 43. The rotatable closure 15a is similar to the described closure 15 and has serrations 16a around its diameter.

The primary purpose of the second form of the invention is to provide means whereby all exposed parts of the conetome may be sterilized, for example, in an autoclave. To this end, the battery, motor and gear box (referred to by legend in FIGURE 8) are contained in a cylindrical housing 44 which, in turn, is contained in a hollow cylindrical handle 45. The inner end of the housing 44 has an axial projection 46 around which there is an antifriction bearing 47. The inner race of the bearing 47 is a press fit on the projection 46, whereas the outer race of the bearing is a slip fit in an axial collar 48 on the inner surface of the end of the handle 45.

The forward end of the housing 44 is shouldered around its diameter where it receives the inner race of an antifriction bearing 49. The outer race of the bearing 49 slidably engages the inner surface of the forward end of the handle 45. A centrally located collar 50 on the forward end of the housing 44 slidably receives the cylindrical member 20 on which the frame 11 is mounted, and an axial sleeve 51 within and integral with the closure 15a is slidably mounted on the collar 50. A perpendicular

screw 52 through the closure 15a, sleeve 51, the collar 50 and cylindrical member 20 causes the motor housing 44, the frame 11 and the components on the latter to turn independently of the handle 45 when the closure 15a is rotated. As best shown in FIGURES 10 and 11, a spring loaded plunger 53 in the closure 15a is positioned to contact the side of the driven shaft 26 and disengage the coupler members 42 and 43.

The operation of both described forms of the invention is essentially the same. The knob 12 is inserted in the cervical canal a distance to obtain a specimen of sufficient size. The handle 10 or 45 is held firmly in the palm of the hand by last three fingers, and the thumb and forefinger are placed on opposite sides of the serrations 16, or 16a of the closure 15 or 15a which comprises the forward portion of the handle. The motor is activated causing the blades 35 to reciprocate and a conical specimen is cut by moving the handle 10 or 45 in an orbital path and at the same time rotating the forward portion 15 or 15a about the handle axis so as to obtain a conical specimen.

The invention is not limited to the exemplary constructions herein shown and described, but may be made in various ways within the scope of the appended claims.

What is claimed is:

1. In a surgical instrument, an elongate handle, power means carried by said handle, an elongate frame rotatably mounted on said handle and extending from an end thereof, a pair of scalpel blades in side by side relation slidably mounted on the extending end of said frame, means driven by said power means alternately reciprocating said blades along the lengths thereof, and means around said frame engaging the same adjacent the said end of said handle whereby said blades may be rotated about the longitudinal axis of said handle by the thumb and forefinger while firmly holding said handle in the palm of the hand.

2. In a surgical instrument as defined in claim 1, the construction wherein said means alternately reciprocating said blades includes parallel shafts mounted on said frame.

3. In a surgical instrument as defined in claim 1, the construction including a projecting knob on the distal end of said frame.

4. In a surgical instrument as defined in claim 1, the construction wherein said power means is removable from said handle and whereby the remainder of said surgical instrument may be sterilized.

5. In a surgical instrument, a handle, power means carried by said handle, an elongate frame carried by said handle and extending therefrom, a pair of scalpel blades in side by side relation slidably mounted on the extending end of said frame, means driven by said power means alternately reciprocating said blades along the lengths thereof, and including a projecting knob on the distal end of said frame.

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U.S. Cl. X.R.

30—241, 272; 128—305