

July 19, 1960

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2,945,490

SURGICAL INSTRUMENT FOR CERVICAL BIOPSY

Filed Feb. 25, 1958

FIG. 1.

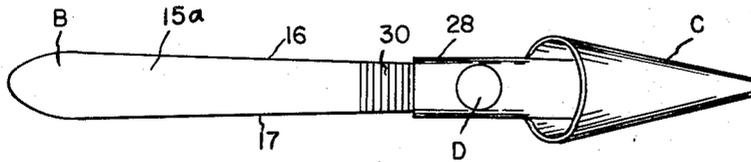


FIG. 2.

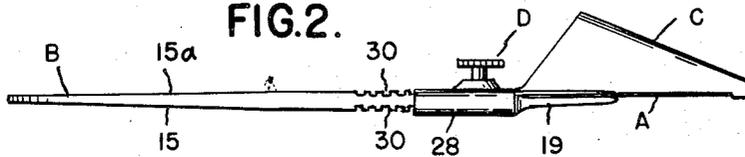


FIG. 3.

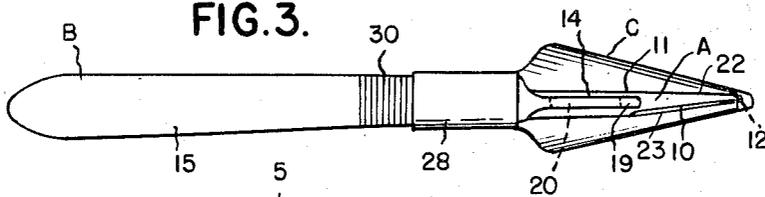


FIG. 4.

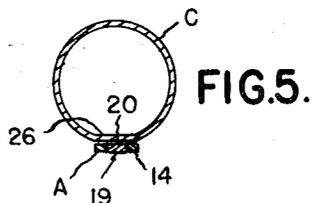
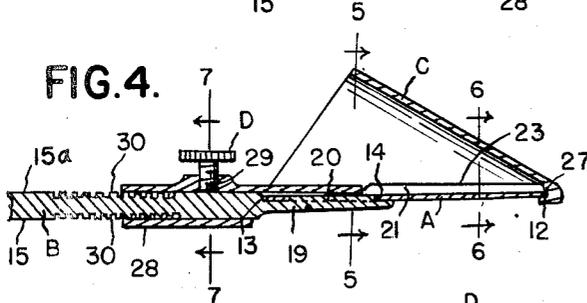


FIG. 6.

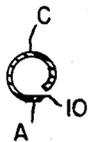


FIG. 7.

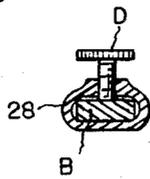


FIG. 8.

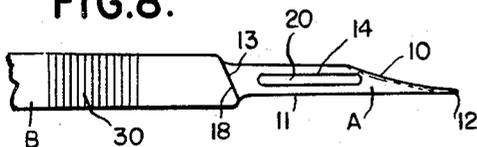
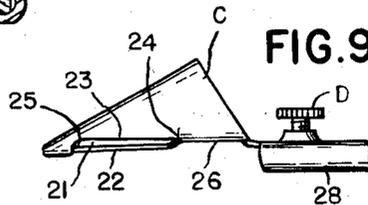


FIG. 9.



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1

2,945,490

SURGICAL INSTRUMENT FOR CERVICAL BIOPSY

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Filed Feb. 25, 1958, Ser. No. 717,391

11 Claims. (Cl. 128-2)

This invention relates generally to surgical equipment, and refers more particularly to a surgical instrument for removing or taking a specimen of tissue from the cervix uteri for microscopic examinations, with particular interest in the early diagnosis of cancer.

One of the essential objects of the invention is to provide an instrument capable of removing an entire surface area in question without destruction of cellular structure and without missing a dangerous lesion altogether.

Another object is to provide an instrument capable of removing a continuous, uninterrupted and cleanly cut specimen.

Another object is to provide an instrument having a substantially straight cutting element or blade, and a rearwardly opening hollow cone beside said cutting element and provided lengthwise of the cutting edge thereof with a longitudinally extending slot through which the removed specimen of tissue is adapted to enter the interior of the cone during operation of the instrument.

Another object is to provide an instrument wherein the construction and arrangement of the cutting element and cone is such that a specimen of predetermined uniform thickness is obtained.

Another object is to provide an instrument wherein the rearwardly opening cone provides the surgeon throughout the entire operation with a clear view of the specimen as it is being removed by the cutting element.

Another object is to provide an instrument wherein the cone serves as a pilot or guide for the cutting element during the cutting operation.

Another object is to provide an instrument wherein the cone excludes blood from the interior thereof while such cone receives and collects within said interior from the slot aforesaid the specimen of tissue as it is removed by the cutting element.

Another object is to provide an instrument wherein the cone has at opposite ends of said slot offset portions or shoulders that cooperate with the cutting edge of the cutting element to define the margins between which the cutting is accomplished.

Another object is to provide an instrument wherein the cone is adapted to be pushed inward sufficiently hard to keep the uncut tissue stretched in advance of the cutting element while the latter is moved both in a clockwise direction and lengthwise in short rapid strokes to remove the specimen of tissue desired.

Another object is to provide an instrument wherein the cone has at the closed forward end or tip thereof a rearwardly opening recess or socket for receiving the forward free end of the cutting element, and has at the open rear end thereof a rearwardly projecting loop or band that may be detachably sleeved upon a handle for the cutting element.

Another object is to provide an instrument wherein the cone is an attachment, and may be readily applied to and removed from a standard form of scalpel or other forms of knives of this general type, wherein the cutting ele-

2

ment or blade and the handle therefor are arranged end to end.

Another object is to provide an instrument that is simple in construction, economical to manufacture and efficient in operation.

Other objects, advantages and novel details of construction of this invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawing wherein:

Figure 1 is a top plan view of an instrument embodying my invention;

Figure 2 is a side elevational view of the instrument illustrated in Figure 1;

Figure 3 is a bottom plan view of the instrument illustrated in Figure 1;

Figure 4 is a fragmentary longitudinal vertical sectional view through the instrument;

Figure 5 is a cross sectional view taken substantially on the line 5-5 of Figure 4;

Figure 6 is a cross sectional view taken substantially on the line 6-6 of Figure 4;

Figure 7 is a cross sectional view taken substantially on the line 7-7 of Figure 4;

Figure 8 is a fragmentary plan view of the cutting element and handle therefor; and

Figure 9 is an elevational view of the cone, loop and set screw.

In the drawing, A is the cutting element, B is the handle therefor, C is the hollow cone, and D is a set screw for holding the parts mentioned in assembled relation.

As shown, the cutting element A is a straight relatively narrow elongated relatively thin blade having a straight cutting edge 10 extending at an angle to the longitudinal median line of the blade from a point substantially midway its ends to the forward free end thereof and cooperating with the straight rear edge 11 of said blade to provide a point 12 at said forward free end. Such blade has a straight rear end 13 also extending at an angle to the longitudinal median line thereof and has at the longitudinal median line thereof between said cutting edge 10 and rear edge 11 an elongated longitudinally extending slot 14.

The handle B is a straight relatively narrow elongated solid body preferably of metal such as stainless steel, having flat sides 15 and 15a respectively tapering gradually from front to rear thereof and having straight edges 16 and 17 respectively diverging gradually from front to rear thereof. Such handle B has at its forward end a straight edge 18 extending at an angle to the longitudinal median line thereof and corresponding to and abutting the rear end 13 of the cutting element or blade A and is provided in advance of said edge 18 with a forwardly projecting narrow elongated tongue 19 that overlaps in surface to surface relation one side of the blade A and is provided with a laterally projecting longitudinally extending rib 20 that is removably received within the slot 14 in the blade A. Thus the cutting element or blade A and the handle B collectively may constitute a standard form of scalpel wherein the blade A may be replaced by a fresh blade whenever desired. However, it is apparent that other knives of this general type may be employed.

The hollow cone C is elongated and opens rearwardly. Such cone is preferably formed of metal, such as stainless steel, and is provided lengthwise of the cutting edge 10 of the cutting element or blade A with a longitudinally extending slot 21 through which the removed specimen of tissue is adapted to enter the interior of the cone during operation of the instrument. Preferably one side edge portion 22 of the slot 21 is pressed outward uniformly throughout its length to extend along and substantially meet or abut the straight rear edge 11 of the

blade, while the opposite side edge portion 23 of the slot 21 is depressed inward uniformly throughout its length in parallel relation to the cutting edge 10 of the blade to define the thickness of the specimen of tissue taken or removed by the cutting edge 10 of the blade and to provide at opposite ends of said slot 21 shoulders 24 and 25 that cooperate with the cutting edge 10 of the blade to define the margins between which the cutting is accomplished. Between the rear end of the slot 21 and the rear of the cone C is a flattened portion 26 forming a seat or bearing for the blade A, and in the forward shoulder 25 adjacent the closed forward end or tip of the cone is a rearwardly opening recess or socket 27 for receiving the forward free pointed end 12 of the blade.

At its open rear end the cone C has a rearwardly projecting longitudinally extending loop or band 28 that may be detachably sleeved upon the handle B for the blade, so that the cone C may be readily assembled with and removed from the blade A and handle B therefor. Such loop or band 28 is flattened to conform to the cross section of the handle B and is provided at one side with a threaded opening 29 in which the set screw D may be manipulated for engagement with the adjacent side 14 of the handle to hold the parts mentioned in assembled relation. Thus it is apparent that the cone C is an attachment, and may be readily applied to and removed from a standard form of scalpel or other forms of knives of this general type, wherein the cutting element or blade and the handle therefor are arranged end to end.

If desired, transversely extending serrations 30 may be provided in opposite sides 14 and 15 of the handle B to form non-slip portions for the fingers of the surgeon. However, such serrations form no part of the present invention.

In use, the cone C is inserted into the canal of the cervix and is pushed inward sufficiently hard to stretch and keep stretched the tissue in advance of the cutting edge 10 of the blade A. The instrument is then manipulated by the handle B so that the blade A is moved both in a clockwise direction and lengthwise in short rapid strokes to remove the specimen of tissue desired. Such specimen will have a uniform thickness as it is taken by the cutting edge 10 of the blade, due to the uniformly spaced relation of the inwardly depressed portion 23 of the cone to the cutting edge 10 of the blade, and will be removed in a continuous, uninterrupted strip between the spaced shoulders 24 and 25 of the cone without destruction of cellular structure and without missing a dangerous lesion altogether. In this connection, the rearwardly opening hollow cone C will provide the surgeon throughout the entire operation with a clear view of the specimen as it is being removed. The slot 21 in the cone C will receive the removed specimen and in cooperation with the inwardly depressed portion 23 and the spaced shoulders 24 and 25 will direct the specimen inward to the interior of said cone.

During the cutting operation, the cone C serves as a pilot or guide for the cutting edge 10 of the blade and excludes blood from the interior of the cone while the specimen of tissue being removed by the cutting edge 10 of the blade passes through the slot 21 into and collects within the interior of the cone C. After the operation is complete, the specimen of tissue may be removed from the cone C so that it may thereafter be subjected to the proper microscopic examination, and the set screw D may be loosened to enable the parts of the instrument to be separated or disassembled for sterilization purposes. Thus the pathologist will receive in excellent condition a complete and representative specimen of tissue and can make a better and more accurate diagnosis.

The following advantages are noted:

(1) The cleanly cut specimen is constantly visible to the surgeon as it enters the cone from the cutting edge of the blade, and has the appearance of a skin graft.

As the sectioning continues the specimen accumulates, and the surgeon is always sure of what is taking place.

(2) The specimen enters the cone with little or no blood, because the cervix is stretched by the pressure of the cone.

(3) The specimen is uniform in thickness because the space between the cutting edge of the blade and the cone proper limits the depth of the section.

(4) Any part can be tagged if desired since the surgeon is always aware of the source of the tissue being cut at any moment.

(5) Preliminary dilatation is seldom necessary. Also, since the blade ends in a sharp point, the tip of the cone is therefore narrow and enters the canal easily. If the surgeon does this procedure before a dilatation and curettage rather than afterward, the specimen is not crushed, torn or abraded.

(6) The mucocutaneous area of the endocervix can be removed in one continuous strip, or segmentally if a certain area is suspected. Repeated sections can be made for greater depth where needed.

(7) The surface of the dissection presents a smooth appearance. Being free from thermal damage, it heals quicker with no sloughing and scarring and contracture are minimized. Also, the pathologist is not handicapped by thermal distortion of his specimen.

(8) The procedure does not require the hands of an assistant. It is useful in either office or operating room.

(9) The instrument is light and does not affect the "feel" of the scalpel. Since it consists of a rigid piece of steel with a single thumb screw that cannot fall out, it is uncomplicated, rugged and inexpensive.

Three sizes are designed for canals of varying diameter. The one centimeter cone is for the very narrow diameter; the two centimeter cone is best for the average case; and the three centimeter size adapts to the cervix that is patulous from old lacerations.

Technique

With the patient in the lithotomy position, the cervix is grasped anteriorly with a tenaculum; well below the bladder area. Preliminary dilatation is not done except in the occasional case where needed. The appropriate cone, attached to the scalpel, is introduced into the cervical canal with the knife edge at the "twelve o'clock" mark. Cutting proceeds in a clockwise direction by making short rapid strokes of the scalpel, always pushing the cone inward sufficiently hard to keep the tissue stretched in advance of the cutting edge of the blade. If this is done the cut slice will not buckle but will flow smoothly through the slot into the cone from the cutting edge of the blade. With a little practice the surgeon can remove the entire endocervical specimen in one ribbon. The surgeon moves the cutting edge of the blade around the complete circle and back to the starting point, and then just a little beyond before relaxing the pressure. The ribbon may be severed from this final point of attachment by a snip of the scissors, or the specimen may be pulled taut by tissue forceps from within, where it is entering the cone, in which case the scalpel blade will readily cut it free. If the specimen buckles from interruption of the cone's pressure, the surgeon can trim off the piece and carry on from that point, or the surgeon can draw the piece into the cone to make it taut and then proceed as if nothing had happened. If one circuit does not satisfy the surgeon, then repeated cuts over any area can be made for greater depth of dissection.

The cut surface is smooth and neat in appearance but it bleeds freely. Control by hemostatic or ordinary gauze may suffice, but if a deeper dissection has been done the surgeon will probably encounter a brisk arterial flow that requires the placing of catgut sutures laterally and deep, or the surgeon can bring the anterior and posterior cervical lips together with deeply placed absorbable sutures, leaving, of course, a central canal. It is be-

5

lieved that sparing the diathermy current, even for point coagulation, has paid off in less post operative delayed hemorrhage.

What I claim as my invention is:

1. In a surgical instrument for removing a specimen of tissue from the cervix uteri, the combination with an elongated handle, an elongated tongue connected to and projecting endwise from said handle, and an elongated blade detachably connected to and carried by said tongue and having a longitudinally extending cutting edge, of a hollow elongated specimen receiving cone detachably connected to said handle and extending lengthwise of said tongue and of said blade, the tip of said cone projecting forwardly beyond and serving as a pilot for said blade, one side of said cone adjacent said blade being provided lengthwise of said cutting edge with a longitudinally extending slot through which the specimen removed by said cutting edge is adapted to enter the interior of said cone during operation of said instrument, the rear end of said cone being open and unobstructed so that a clear view of the specimen is provided through said open rear end while said specimen is being removed by the cutting edge of said blade.

2. In a surgical instrument for removing a specimen of tissue from the cervix uteri, the combination with an elongated handle, an elongated tongue connected to and projecting endwise from said handle, and an elongated blade detachably connected to and carried by said tongue and having a longitudinally extending cutting edge, of a hollow elongated specimen receiving cone detachably connected to said handle and extending lengthwise of said tongue and of said blade, the tip of said cone being closed and projecting forwardly beyond and serving as a pilot for said blade, one side of said cone adjacent said blade being provided lengthwise of said cutting edge with a longitudinally extending slot through which the specimen removed by said cutting edge is adapted to enter the interior of said cone during operation of said instrument, said cone being provided adjacent said closed tip with a rearwardly opening recess receiving the forward end of said blade, the rear end of said cone being open and unobstructed so that a clear view of the specimen is provided through said open rear end while said specimen is being removed by the cutting edge of said blade.

3. A surgical instrument for removing a specimen of tissue from the cervix uteri; comprising an elongated handle, an elongated tongue connected to and projecting endwise from the forward end of said handle, an elongated hollow specimen receiving rearwardly flaring cone connected to said handle and disposed beyond the forward end thereof, one side of said cone being in spaced substantially parallel relation to said tongue, the tip of said cone being substantially in longitudinal alignment with and spaced forwardly from the forward end of said tongue, and an elongated blade between the forward end of said handle and the tip of said cone within the space between and extending lengthwise of said tongue and said

6

one side of said cone, said blade being connected to and carried solely by said tongue, said blade having a longitudinally extending cutting edge in spaced substantially parallel relation to said one side of said cone, said one side of said cone having adjacent said blade a longitudinally extending elongated slot through which the specimen removed by the cutting edge of said blade is adapted to enter the interior of said cone during operation of said instrument, and the rear end of said rearwardly flaring cone being open and unobstructed adjacent one side of said handle so that a clear view of the specimen is provided through said open rear end while said specimen is being removed by the cutting edge of said blade.

4. The instrument described in claim 3, wherein said cone has adjacent the tip thereof a rearwardly opening recess receiving the forward end of said blade, and the tip of said cone is closed and forms a pilot for said blade.

5. The instrument described in claim 3, wherein the connection between said cone and said handle includes a loop rigid with said cone and sleeved on said handle, and a set screw carried by said loop and engaging one side of said handle.

6. The instrument described in claim 3, wherein said cone is provided adjacent the tip thereof with a rearwardly opening recess receiving and forming a sheath for the forward end of said blade.

7. The instrument described in claim 3, wherein the open rear end of said cone is disposed at substantially an obtuse angle to one side of said handle.

8. The instrument described in claim 3, wherein the connection between said cone and said handle includes an element connected to said cone at the open rear end thereof and detachably connected to said handle.

9. The instrument described in claim 3, wherein the slot tapers toward the tip of said cone, and one longitudinally extending side edge of the slot in said cone is the leading slot edge and is spaced from, substantially parallel to, and cooperates with the cutting edge of said blade to define the thickness of the specimen removed by said cutting edge.

10. The instrument described in claim 9, wherein said cone is provided at longitudinally spaced points of said leading slot edge with means to define the width of the specimen removed by said cutting edge.

11. The instrument described in claim 10, wherein the opposite longitudinally extending side edge of said slot is the trailing slot edge and extends along the rear edge of said blade in abutting engagement therewith.

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