

- [54] **MEDICAL EXAMINING INSTRUMENT**
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[73] Assignee: **Medical Testing Systems, Inc., Beverly Hills, Calif.**
[22] Filed: **Aug. 14, 1972**
[21] Appl. No.: **280,112**

Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 192,390, Oct. 26, 1971, Pat. No. 3,762,400, which is a continuation-in-part of Ser. No. 144,468, May 18, 1971, Pat. No. 3,744,481.
[52] U.S. Cl. **128/18**
[51] Int. Cl. **A61b 1/06, A61b 1/32, A61b 1/30**
[58] Field of Search **128/17, 18, 244, 345**

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"New Kleenspec Illuminated Disposable Vaginal

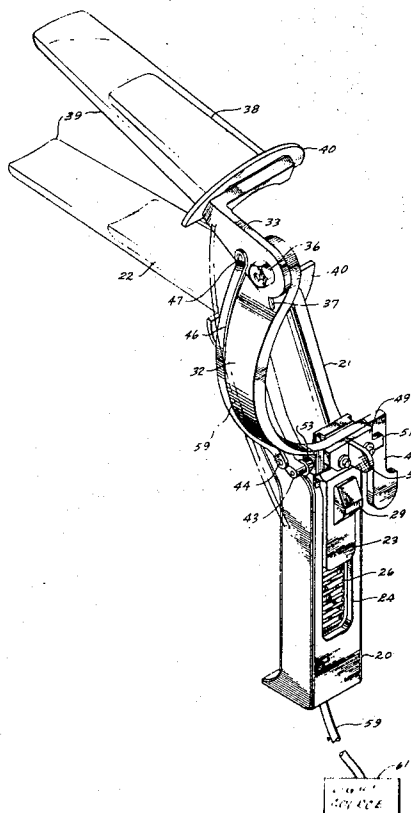
Speculum," advertisement of Welch Allyn, Inc. IN MSR, February 1970 p. 35.

Primary Examiner—Channing L. Pace
Attorney, Agent, or Firm—Edward H. Loveman

[57] **ABSTRACT**

An improved vaginal speculum having hollow transparent plastic blades that fit on tangs extending from a handle. A lower tang is fixed to the handle at about a right angle. A slider can move along the handle and is held in an extended position by a ratchet. The upper tang is mounted on an arm extending from the slider and a thumb operated lever permits the angle between the blades to be changed. Springs bias the blades towards each other with adjustable force and means may be provided at the ends of the blades for gripping a cervix. Various embodiments of blades are disclosed, including one having a slot at its leading end for receiving any of a variety of inserts. Light from a remote light source is transmitted to the end of one or both tangs by a fiber optic bundle.

12 Claims, 16 Drawing Figures



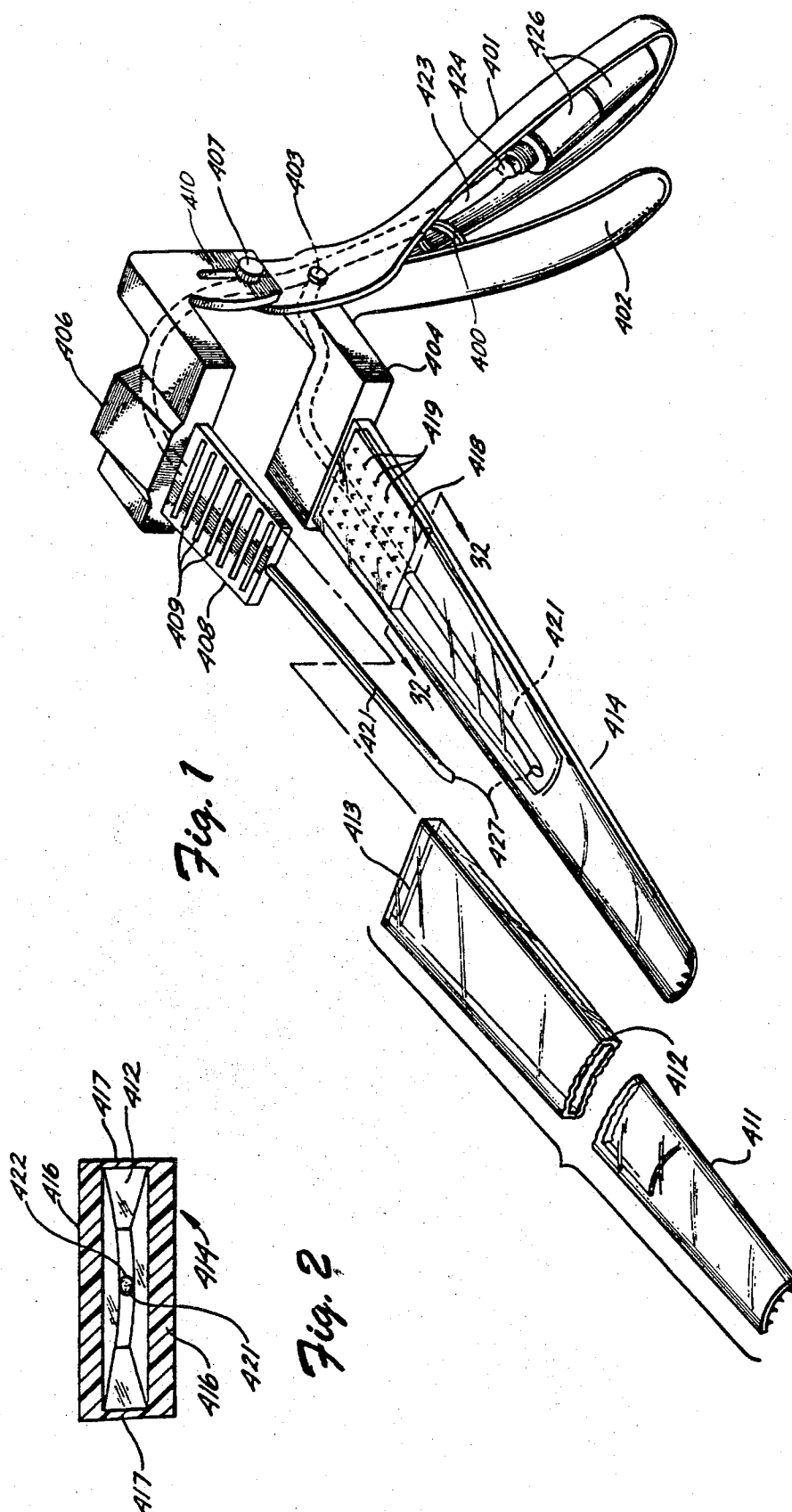


Fig. 3

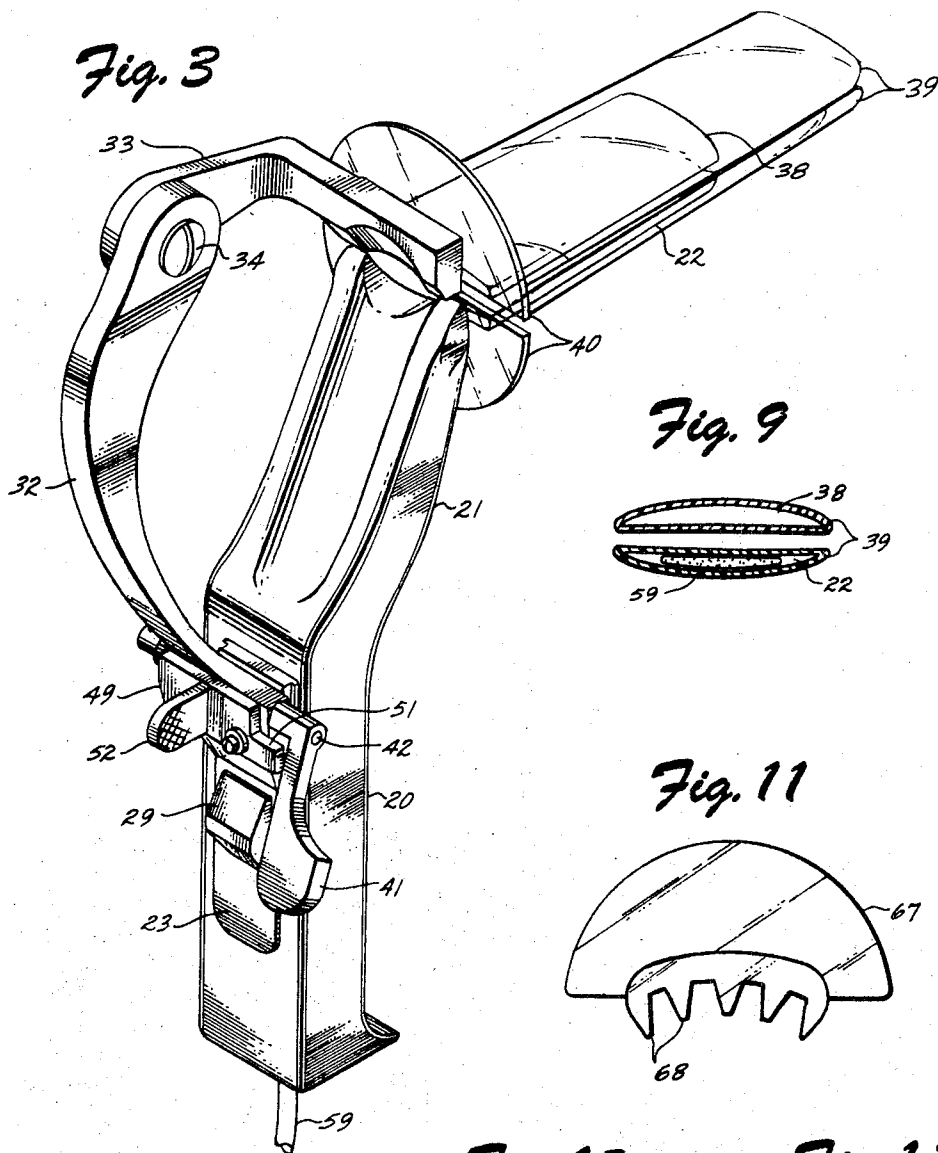


Fig. 9

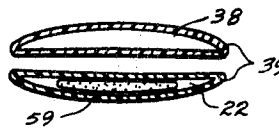


Fig. 11

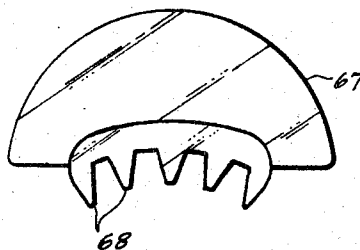


Fig. 12

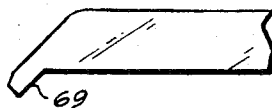


Fig. 13



Fig. 10

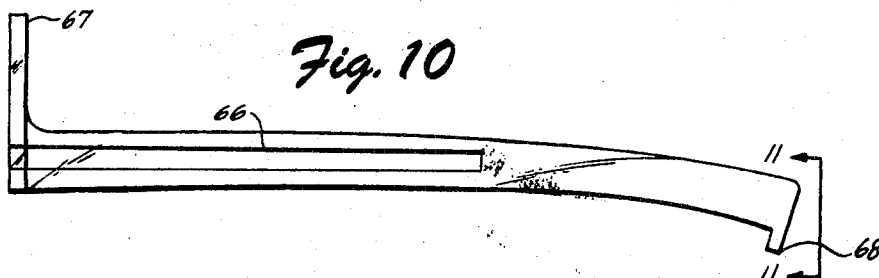


Fig. 4

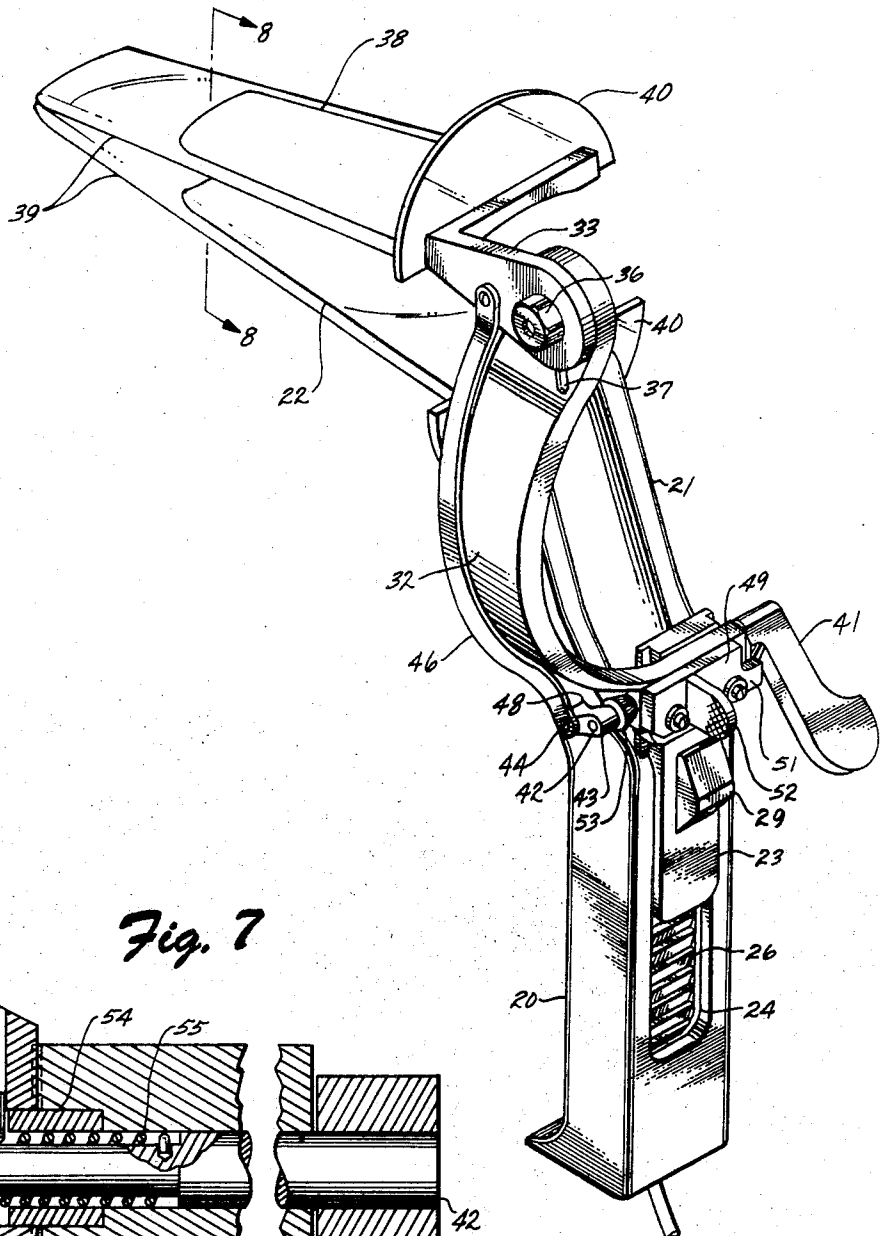


Fig. 7

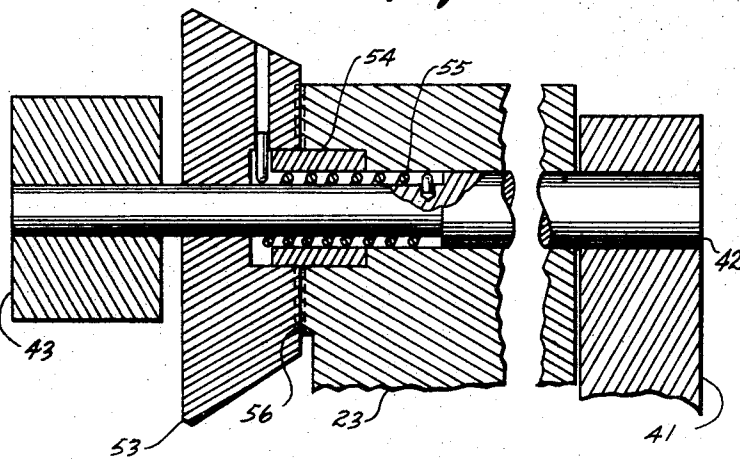


Fig. 5

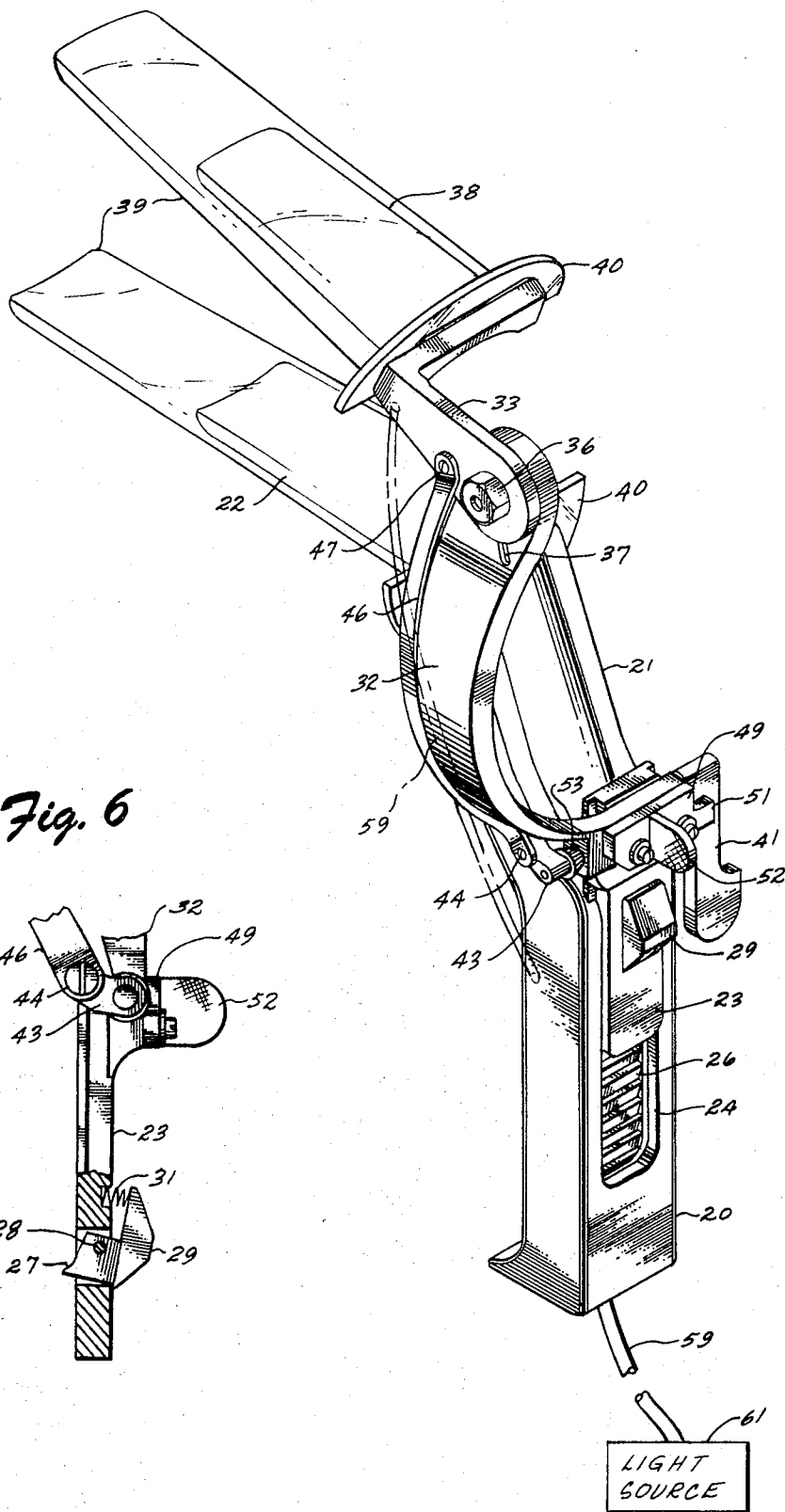
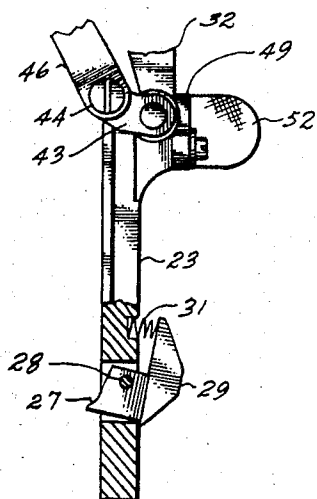


Fig. 6



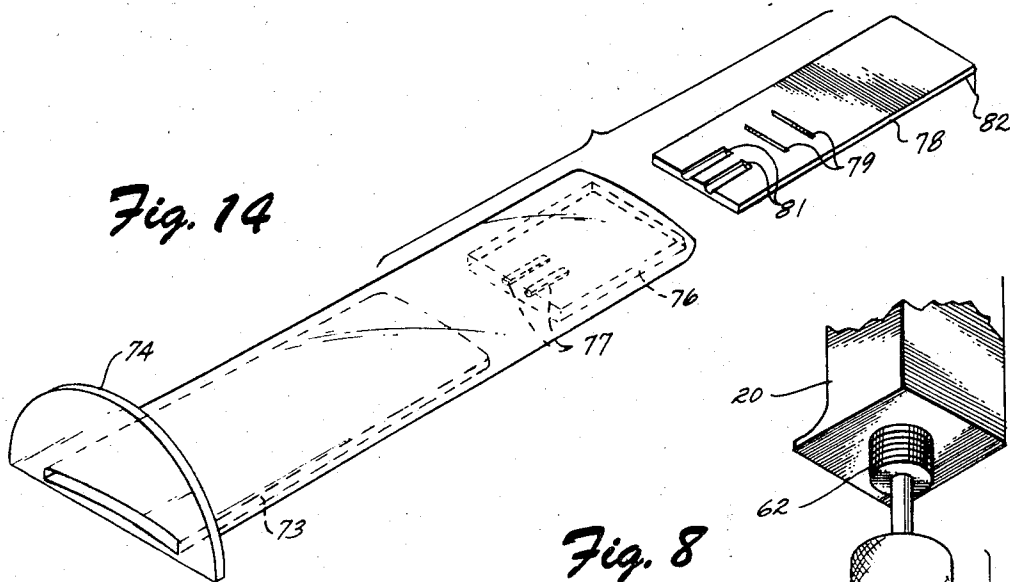


Fig. 8

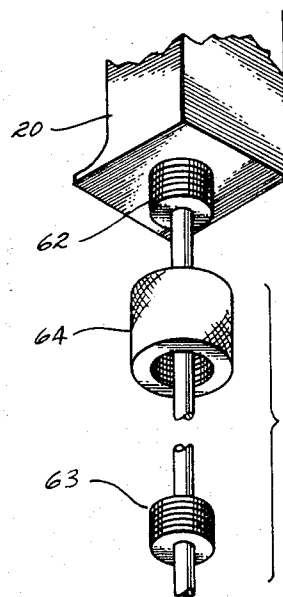


Fig. 15

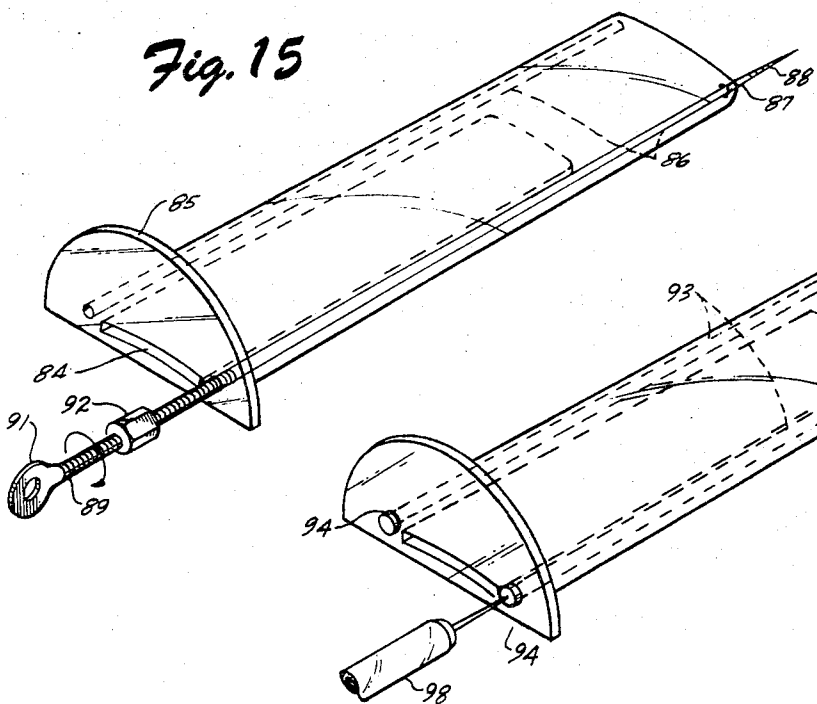
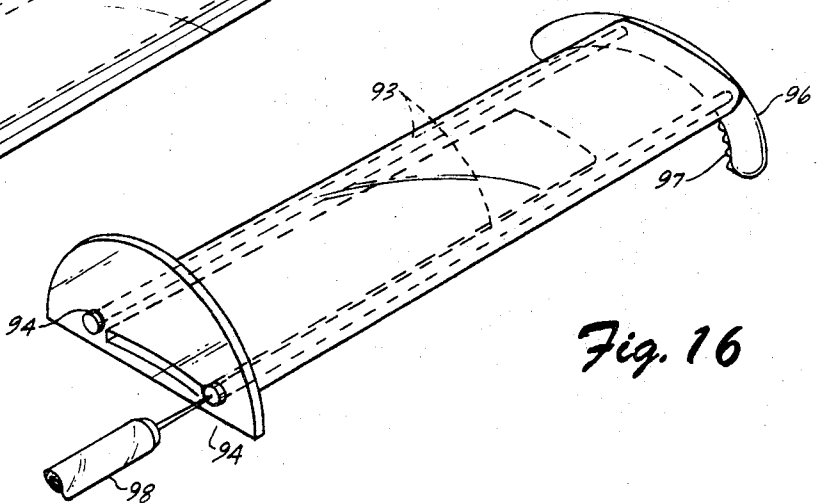


Fig. 16



MEDICAL EXAMINING INSTRUMENT

BACKGROUND OF THE INVENTION

This is a continuation-in-part of my copending patent application entitled MEDICAL EXAMINING INSTRUMENT, Ser. No. 192,390, filed Oct. 26, 1971, now U.S. Pat. No. 3,762,400 dated Oct. 2, 1973, which was a continuation-in-part of my copending patent application entitled MEDICAL EXAMINING METHOD AND MEANS, Ser. No. 144,468, filed May 18, 1971, now U.S. Pat. No. 3,744,481 dated July 10, 1973.

In a normal dormant state, the walls of the vagina are situated in close juxtaposition about their axial center, thus preventing direct visual observation of the cervix uteri as required for medical examination or surgery. The prior art includes a familiar type of device known as a vaginal speculum having a pair of elongated metal blades pivotally joined together about a fulcrum whereby parting of the blades after their initial placement in situ separates and holds apart the vaginal walls. It is an inherent disadvantage of vaginal specula that the fulcrum supporting structure and the means for retaining the blades in spaced apart relationship unavoidably restricts both the access area and the field of view of the situs which is sought to be examined or operated upon, particularly when instrumental contact with the cervix must be made.

To surgically or diagnostically operate on the cervix such as, for example, conization, cauterization, specimen collection or the like, it is necessary to hold the cervix securely against movement. The device most widely used in the prior art for this purpose is of the type known as tenacula. A tenaculum forcibly engages and holds the cervix to prevent its movement during surgical procedures involving the cervix uteri. This instrument is functionally distinguishable from the vaginal speculum in that the latter does not grasp anything but merely spreads the vaginal wall apart.

It is not an uncommon practice in some operative techniques to involve both instruments simultaneously which is especially cumbersome, confining and severely restricts both the field of observation and the freedom of surgical instrument movement. Moreover, neither the tenaculum nor the speculum offers any solution to the problem of providing adequate illumination to permit detailed examination of surfaces in and around the cervix.

The typical vaginal speculum has a pair of metal blades that engage the walls of the vagina. With such an instrument, cleaning and sterilization between usages is mandatory to prevent the spread of infection from one patient to another. Such a procedure is both cumbersome and time consuming and usually requires that the physician have several specula available so that some may be used while others are being cleaned. Recently, all plastic specula have been introduced for one time diagnostic use. These instruments are sufficiently inexpensive that they can be discarded and a new instrument used for each patient. Although such specula may be adequate for taking of diagnostic specimens, they are insufficiently sturdy for most surgical use. Typically they are limited to spreading of the vaginal walls throughout their length as the blades move directly away from each other and there is no provision for tilting of the blades around a fulcrum.

It is desirable to have a vaginal speculum sufficiently rugged for surgical purposes and yet inexpensively operated with disposable parts to minimize the need for cleaning and sterilization. Preferably such an instrument provides illumination for examination or surgical procedures. It is also desirable that the instrument be provided with a variety of blades for grasping the cervix.

BRIEF SUMMARY OF THE INVENTION

Thus, in practice of this invention according to a presently preferred embodiment, there is provided a speculum having a lower blade support tang fixed on a handle. An upper blade support tang is mounted on a slide for ratcheting movement along the length of the handle. The upper tang is pivoted about an axis transverse to the movement of the slide and a lever on the slide tilts the upper tang. The tangs are resiliently biased towards each other and means are provided for temporarily latching the tangs apart. A hollow transparent blade is fitted on each tang during use of the instrument. An extension may be mounted on each blade for grasping the cervix. Fiber optics may transmit light from a remote light source to the end of one or both tangs.

DRAWINGS

These and other features and advantages of the present invention will be appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 illustrates in perspective one embodiment of combined speculum and tenaculum having removable blades constructed according to principles of this invention;

FIG. 2 is a transverse cross section through one of the blades of FIG. 1;

FIG. 3 is a perspective view of another embodiment of a vaginal speculum constructed according to principles of this invention in a closed position;

FIG. 4 is another perspective view of the speculum of FIG. 3 in a partially opened position;

FIG. 5 is a perspective view similar to FIG. 2 with the speculum in a fully opened position;

FIG. 6 is a detailed view of the slide on the speculum of FIG. 1;

FIG. 7 is a detail of a spring adjustment for the speculum of FIG. 3;

FIG. 8 is a detail of attachment of a fiber optic bundle to the handle of the speculum;

FIG. 9 is a transverse cross section through the blades of the speculum;

FIG. 10 is a side view of an alternative blade;

FIG. 11 is an end view of the blade of FIG. 10;

FIGS. 12 and 13 are variations of blade tip suitable for use with the speculum;

FIG. 14 is an exploded perspective view of another embodiment of blade for the speculum of FIG. 3;

FIG. 15 illustrates another blade suitable for the speculum of FIG. 3 with a unique means for holding a cervix; and

FIG. 16 illustrates still another variety of blade suitable for use with the improved medical examining instrument.

DESCRIPTION

FIG. 1 illustrates in perspective a medical examining instrument constructed according to principles of this invention. A pair of handle elements 401 and 402 are pivotally interconnected by a pin 403. For purposes of exposition, it is considered that the proximal handle 401 remains fixed in position and the distal handle 402 can be pinched towards the proximal handle 401 to pivot around the pin 403. The handles are biased apart by a spring 400. The distal handle 402 is rigidly connected to a lower blade support bracket 404. The proximal handle 401 is adjustably connected to an upper support bracket 406 by a thumb screw 407 to permit adjustment. The upper support bracket can be slidably moved towards and away from the pivot 403 and latched in a desired position by the thumb screw 407 which is free to move in a slot 410.

A rectangular, tapered tang 408 extends forwardly from the upper support bracket 406. At least one surface of the tang 408 is provided with small, tooth-like ridges 409 having a shallow angle ramp on a distal edge and a steep ramp on the proximal edge.

Exploded from the upper tang 408 in FIG. 1 is an upper blade 411 made of a transparent plastic material. Since the blade 411 is transparent, an internal cavity 412 can be seen therein and is further seen in the cut-away section of the blade. The internal cavity is blind or closed towards the distal end of the blade 411 and has an open mouth 413 at its proximal end. As illustrated in this embodiment, the blade near the mouth 413 is rectangular in crosssection and so is the mouth of the cavity. The distal end of the blade is curved for use of the instrument within the body and it is therefore preferable that the distal end of the cavity also be curved to conform. This is also seen in FIG. 2 which comprises a cross section of a similar lower blade 414. If desired, the proximal portion of the blade and the mouth 413 can also be made with a curved profile and if this is done, the tang 408 is also made curved to be complementary to the cavity 412.

When the blade 411 is placed on the rest of the instrument, the mouth 413 of the cavity is slid over the tang 408 and across the ridges 409. Since the ridges are somewhat like teeth, they firmly engage the plastic blade to prevent it from being removed under the forces normally encountered in a body examination. A particular advantage of the instrument is that the blades are inexpensive and disposable, thereby eliminating any need for sterilization between uses. Since the ridges 409 hold the blades in place firmly, other means are provided for removing the blade from the tang 408. Thus as seen in the cross section of FIG. 2, the two broader sides 416 of the blade are made relatively thick for strength and rigidity. The narrower side edges 417 are made relatively thin so as to be readily broken by hand. Thus, when one has completed use of the instrument, it is only necessary to push the blade 411 to one side relative to the tang 408 whereupon one or both of the thinner sides 417 breaks away, letting the blade drop from the instrument.

The lower blade 414 and upper blade 411 are preferably identical for ease in manufacture. A slight modification is also shown in FIG. 1 on the lower tang 418 forming a part of the lower blade support bracket 404. Instead of ridges as provided on the upper tang 408, a plurality of small nibs 419 protrude outwardly from the

tang in order to engage the plastic blade and prevent its withdrawal from the end of the tang. Preferably the nibs 419 are asymmetrical somewhat like the teeth on a rasp to permit the blade to be inserted readily by hand and yet to inhibit withdrawal of the blade.

Protruding forwardly from the tangs 408 and 418 are similar fiber optic bundles 421. Preferably, as seen in FIG. 2, the fiber optic bundle is surrounded by a relatively rigid, yet elastically flexible plastic sleeve 422. The sleeve serves to protect the fiber optic bundle from damage when a blade 411 or 414 is removed from the instrument since it can elastically deform to some extent. The cavity 412 within the blade is preferably kept relatively wide in the region surrounding the fiber optic bundle to permit it to be twisted to the side to break away the thin walls 417 without unduly encountering the fiber optic bundle.

The fiber optic bundle 421 has an end 423 within the hollow portion of the proximal handle 401. This end is adjacent a high intensity light bulb 424 electrically connected to dry cell batteries 426 in a conventional manner. A switch (not shown) is provided near the upper portion of the proximal handle 401 for easy thumb operation. The fiber optic bundle passes upwardly adjacent the handle 401 and forks into two bundles adjacent the blade support brackets and then the two forks pass through the center of the respective blade mounting tangs 408 and 418. The distal end 427 of each of the fiber optic bundles is preferably slightly curved relatively inwardly and cut off at a slight angle so that light from the bulb 424 passes through the bundle and is projected from the end 427 somewhat inwardly in a forwardly converging direction. Some of the light is transmitted directly through the transparent blades adjacent the end of the cavity therein and a portion is transmitted along the length of the blades to provide adequate illumination when the instrument is used.

The use of a hollow blade that fits on an extending member in the manner of a mortise and tenon is advantageous for ease of use and also for accommodation of fiber optics or similar lighting sources. The hollow disposable transparent plastic blade permits the lighting to be directed as desired by permanent fiber optics. If desired, the tang may be appreciably longer and the fiber optics have only an end exposed for illumination. In such an embodiment, a more flexible blade may be used with more rigidity contributed by the tang. Such a long blade may be put on the tang in the manner of a sock or glove and may be removed by tearing away a deliberately weakened section. A strong string or wire may be embedded in the plastic to aid in cutting away the plastic.

FIG. 3 illustrates from the right rear another embodiment of speculum constructed according to principles of this invention. As seen in this view, the speculum is in a closed position for insertion into a vagina. FIG. 4 illustrates the same instrument from the left rear in a partially open position. FIG. 5 illustrates the same instrument in a view similar to FIG. 4 except that it is in a completely open position. Additional details of the instrument are illustrated in fragmentary views 6 to 9.

The speculum has a handle portion 20 integral with an angled extension portion 21 that is, in turn, integral with a lower blade support tang 22. Preferably the extension portion 21 is recessed or hollowed out on its upper and rearward portions as much as feasible to pro-

vide maximum access through the speculum for surgical instruments. It is preferred that the handle and lower blade support tang be made of stainless steel or the like for strength or corrosion resistance. This permits the blade support tang to be rather thin and still retain adequate strength.

A slide 23 is mounted for movement along the length of the handle 20. The slide has a T-shaped cross section that fits into a T-shaped slot 24 (FIGS. 4 and 5) extending along the length of the handle, thereby permitting the slide to move up and down and yet be retained rigidly against tilting motions.

A series of ratchet teeth 26 are formed on the inside of the T-slot in the handle for engagement by a pawl 27 mounted on the slide 23 (FIG. 6). The pawl is pivotally mounted on a pin 28 extending transverse to the slot. A thumb knob 29 is integral with the pawl. A spring 31 biases the knob so that the pawl engages the teeth 26 unless tilted away by the thumb. This ratchet and pawl arrangement permits upward movement of the slide merely by pressing in an upward direction on the knob 29 with the thumb of the same hand that is holding the handle. Typically this speculum is employed in the left hand and the knob is offset towards the right of the slide for greater convenience. To release the ratchet and permit the slide to move downwardly along the handle, the upper end of the knob 29 is pressed, which disengages the pawl from the ratchet teeth and also applies a downward force on the slide.

An upper support arm 32 is integral with the slide 23 or bolted thereto. The support arm 32 extends laterally from the slide, curving outwardly and upwardly to provide a rigid support and yet provide substantial clearance for observation or surgical instruments. A pivot arm 33 is mounted on the upper end of the upper support arm 32 with a substantial bearing area therebetween for maintaining alignment and preventing wobble. The pivot arm is pivotally mounted to the upper support arm on a bolt 34 fitted with a lock nut 36 for keeping the pivot arm in tight engagement with the upper support arm but sufficiently loose to enable free pivoting. A conventional torsion spring 37, only one tip of which is seen in FIGS. 4 and 5, biases the pivot arm 33 relative to the upper support arm 32 for urging the instrument towards a closed position. An upper blade support tang 38 is integral with the pivot arm 33 and forms an extension thereof opposed to the lower tang 22.

Each of the blade support tangs is adapted to receive a hollow transparent plastic blade 39. The blades illustrated in FIGS. 3 to 5 are open at the rearward end for receiving the respective tang and closed at their forward end much in the manner hereinabove described and illustrated in FIG. 1. Since the blades are mounted on the tangs in these illustrations, the sockets within the blades are not separately seen. If desired, the tangs may be roughened or provided with small teeth for engaging the interior of the blades and inhibiting their withdrawal during use.

The blades illustrated in FIGS. 3 to 5 are plain at the tip and are of the sort used for medical examination or maintaining the vagina in an open position during a surgical procedure. Such blades might be used as much as 75 percent of the time that the speculum is employed. There is no substantial force tending to withdraw the blades from the tangs and the frictional engagement between a slightly tapered tang and a tapered socket

within the blade is normally sufficient for inhibiting removal of the blade during use.

Each of the blades has a semi-circular flange or plate 40 adjacent its open end so that when the speculum is used, none of the metal parts thereof come in contact with the pubis of the patient. Only the disposable plastic parts contact the patient and therefore, for most procedures, it is only necessary to replace the disposable blades and extensive cleaning and sterilization of the speculum is obviated.

The blades are illustrated in transverse cross section in FIG. 9 where the tangs are seen in end view. Thus, as illustrated, it is preferred that the tangs and blades are relatively flat on their opposing faces and convex on their outer faces. This permits the blades to be brought as close together as possible during insertion of the speculum into the vagina.

A thumb lever 41 is mounted on a shaft 42 extending across the speculum transverse to the direction of movement of the slide 23. A short lever arm 43 on the other end of the shaft from the thumb lever 41 is connected to a pivot 44. An elevator arm 46 (FIGS. 4 and 5) is also mounted on the pivot 44 at one end. The other end of the elevator arm is connected to the pivot arm 33 by a pivot pin 47.

When the speculum is closed or only partly open as illustrated in FIGS. 3 and 4, the thumb lever 41 tilts rearwardly at an angle relative to the handle 20. The lever arm 43 and elevator arm 46 are thus in a downward position and the blades are relatively closed. The torsion spring 37 and another adjustable spring described hereinafter bias the blades towards this closed position. When it is desired to open the blades to spread their tips apart, as illustrated in FIG. 5, the thumb lever 41 is depressed. This rotates the lever arm 43 mounted on the other end of the shaft 42, causing the elevator arm 46 to rise and pivot the pivot arm 33 about the pivot bolt 34 to swing the upper blade support tang 38 and its associated blade away from the lower blade support tang 22.

A stop 48 on the lever arm 43 encounters the upper support arm 32 for limiting the extent of opening of the blades. Other stops can readily be provided or, if desired, an adjustment screw may be included on the lever arm or other suitable location for adjustably varying the extent of opening of the speculum. It will be noted that the elevator arm 46 is curved outwardly and upwardly, as is the upper support arm 32, to provide access for surgical instruments observation. Any desired curvature or relative positioning of the pivots can be employed so long as the pivot axes remain parallel to each other.

A latch 49 is mounted on the upper end of the slide and is free to slide transversely thereof. A short shank 51 on the latch extends over a part of the lever 41. An operating pad 52 extends rearwardly from the latch. Once the thumb lever 41 has been depressed in the position as illustrated in FIG. 5 for opening the blades, a forefinger can be used on the pad 52 for flipping the latch transversely and passing the shank 51 over the thumb lever. This retains the speculum in its opened position.

Thus to operate the speculum as hereinabove described and illustrated in FIGS. 3 to 5, a pair of blades 39 are fitted onto the upper and lower tangs respectively. The blades are then inserted into the vagina in a closed position as illustrated in FIG. 3. Thereupon the

slide 23 is moved upwardly by pressing on the thumb knob 29. When a desired degree of opening has been attained, the thumb lever 41 is pressed spreading the tips of the blades apart and the latch 49 is then slipped sidewise for latching the lever down and holding the speculum open. If one is merely conducting an examination it is, of course, not necessary to use the latch and the blades can be maintained apart merely by thumb pressure on the lever. All of this is readily done with the left hand, leaving the right hand free for other manipulations. When examination or surgical procedure is completed, the speculum is closed by releasing the latch 49 and permitting the thumb lever to rise. The instrument can then be withdrawn from the vagina or if desired, the thumb knob 29 can be depressed for releasing the pawl 27 from the ratchet teeth 26 so that the slide moves back down the handle and the outer ends of the blades come towards each other. The blades can then be simply pushed off of the tangs and discarded. If desired, breakaway blades as hereinabove described can be used. A wire can be imbedded in the blades along the tang receiving socket for tearing or breaking the plastic for ready removal.

FIG. 7 illustrates in fragmentary cross section an upper portion of the slide 23 where the shaft 42 on which the thumb lever 41 is mounted is located. The end of the shaft on which the lever arm 43 is mounted has a reduced diameter and a knurled spring adjusting knob 53 provides bearing support for the end of the shaft. A short sleeve 54 fits into a counterbore around the shaft in the housing 23 for supporting and centering the adjusting knob 53. A combined tension and torsion spring 55 surrounds a portion of the shaft and has its two ends inserted in holes in the shaft 42 and adjusting knob 53, respectively.

Radial serrations 56, indicated schematically in FIG. 7, are provided between the face of the adjusting knob 53 and the corresponding face of the housing 23. The tension in the spring 55 biases the adjusting knob towards the housing so that the serrations remain in engagement and the knob is secured against rotation relative to the housing. The torsion of the spring 55 biases the shaft relative to the housing in a direction tending to urge the lever arm 43 down and hence bias the tangs towards a closed position. The force of the spring 55 therefore augments the force of the spring 37 (FIGS. 4 and 5) between the upper support arm 32 and the pivot arm 33.

It is often desirable to adjust the force biasing the blades towards their closed position when the instrument is used as a combined speculum and tenaculum. An adjustable biasing force permits the tips of the blades to impose an adjustable force on the cervix for secure gripping. To change the biasing force, the adjustment knob 53 is rotated to change the torsion exerted by the spring 55. The knob is simply rotated by thumb pressure and when the exterior is cone shaped and thumb pressure helps release engagement of the serrations between the knob and housing.

In order to illuminate a surgical or examination site a conventional fiber optic bundle 59 is brought from a remote light source 61 to the handle 20. It has been found desirable to employ a remote light source and an elongated fiber optic bundle to keep the weight of the speculum as low as possible and provide high intensity illumination without any generation of heat within the instrument.

As seen in FIG. 8 it is preferred to have a male threaded stud 62 on the base of the handle for receiving the end of the fiber optic bundle. A male threaded ferrule 63 is fixed on the fiber optic bundle at a predetermined distance from the end thereof. A female threaded sleeve 64 is used for interconnecting the two male threaded portions 62 and 63 which are provided with a combination of right and left handed threads respectively for assembly.

The ferrule 63 is spaced a sufficient distance from the end of the fiber optic bundle so that the bundle can pass up through the handle 20 and extension 21 and along the length of the lower tang 22. The end of the fiber optic bundle is preferably spread in a ribbon like shape with its end terminating at the end of the lower tang 22 as seen in the fragmentary cross section of FIG. 9. Preferably the end of the fiber optic bundle is approximately flush with the end of the tang or it may extend some distance therebeyond within the transparent plastic blades. This interconnection between the fiber optic bundle and the handle permits prepositioning of the end of the fiber optic bundle adjacent the end of the tang and allows removal as may be desired for cleaning or replacement.

If desired the fiber optic bundle can be split and one portion thereof can be brought out of the handle and into the upper blade support tang 38 as illustrated in phantom in FIG. 5. Such an arrangement permits illumination by way of both the upper and lower tangs. Sufficient light intensity can, however, be introduced through the lower tang that it does not appear necessary to use both.

As mentioned hereinabove, the blades 39 illustrated in FIGS. 3 to 5 are plain at their tips for use in medical examination, for example. FIG. 10 illustrates in side view another embodiment of transparent plastic blade suitable for fitting on the tangs of the speculum. This speculum blade has an internal socket 66 for receiving one of the tangs. A flange or plate 67 is formed on the blade adjacent the open end of the socket 66. At the opposite closed end of the blade there are a plurality of teeth 68 as seen in the end view of FIG. 11. When a pair of such blades are mounted on the speculum the teeth 68 engage the cervix in the manner of a tenaculum and hold it securely for surgical procedures.

FIG. 12 illustrates a variation in the tip of a blade of the type illustrated in FIG. 10. According to this arrangement the teeth 69 are angled distally for somewhat greater extension and grasping of the cervix. FIG. 13 illustrates another variation of the tip of the speculum blade wherein the teeth 71 are angled proximally for better gripping of the cervix in some circumstances. Other variations in the tip of the blade will be apparent to one skilled in the art. Thus, for example, a pair of spaced apart teeth may be provided on each blade so that the cervix is engaged by four opposed teeth.

FIG. 14 illustrates in exploded perspective a particularly preferred blade for use with the improved speculum. As illustrated in this embodiment the blade is formed of a transparent plastic material and has an open ended socket 73 so that the blade can be fitted onto a tang of the speculum. A semi-circular flange or plate 74 at the base of the blade serves to prevent contact of the balance of the speculum with the pubis of the patient. At the opposite end of the blade, that is the tip thereof, is a second socket 76 open to the tip and closed at its inner end. A pair of ribs 77 extend into

the socket 76 from one wall thereof and are parallel to the length of the blade.

A steel or plastic insert 78 can be fitted into the socket 76 to extend the length of the blade. Ridges or teeth 79 on one or both faces of the insert engage the inner wall of the socket 76 and permit the insert to be pressed in but inhibit its withdrawal. Shallow grooves 81 extending along the length of the insert receive the ribs 77 to help hold the insert in firm alignment with the blade. Any of a variety of arrangements of teeth 82 may be provided on the end of the insert. In the illustrated arrangement the socket 76 is flat and so is the insert that fits therein. It will be apparent that if desired both the socket 76 and the insert 78 may be curved to more nearly conform to the curvature of the blade.

A blade with an insert such as illustrated in FIG. 14 is valuable for a variety of reasons. Thus, for example, the blade alone on a speculum may be employed for initial examination and then after it is ascertained which of a variety of tips might be suitable, the speculum can be withdrawn and a suitable insert 78 pressed into each blade. A surgical procedure can then be conducted without changing the blades on the speculum. When such a procedure is completed the entire blade and insert is simply discarded. With such an arrangement a variety of inserts having different tooth arrangements, for example, or different lengths may be maintained and all fit into a standard blade. Steel inserts can also have teeth that are bendable so that the physician can adjust the teeth to suit a particular condition noted during an examination. Such procedure is undesirable unless the insert is to be discarded. The blades of this embodiment can be provided in pre-packaged, sterile, pre-lubricated pairs for quick and easy use. Pairs of inserts can also be provided separately for maximum selectivity.

FIG. 15 illustrates still another embodiment of blade suitable for use in practice of this invention. As illustrated in this embodiment the blade has a socket 84 for fitting on the tang of a speculum. A semicircular flange or plate 85 is provided at the proximal end of the blade. A channel or conduit 86 is provided along the length of the blade near each side edge thereof from the rear end that connects to the speculum to the tip end thereof. The channels may be used for irrigation, application of medication, or for a skewer for tightly gripping the cervix. One such skewer 87 is illustrated inserted through one of the channels 86. The skewer is an elongated rod having a thread 88 at the distal end thereof. The threaded portion may, for example, be about one-eighth inch in diameter and five-eighths inch long with a pitch about one-eighth inch. At its opposite or proximal end the skewer 87 has a threaded portion 89 extending a substantial distance along its length. A flattened end 91 serves as a finger grip. A threaded nut 92 is provided on the threaded portion 89 for adjustment along the length of the skewer.

To use such an arrangement the speculum with blades as illustrated in FIG. 15 is inserted in the usual manner. From one to four skewers can then be inserted through the channels 86 and the threaded end 88 forcibly screwed into the rather stiff flesh of the cervix. Although such a procedure is relatively drastic it can be highly valuable when the cervix is anteverted or retracted or if a very fixed traction of the cervix is required. Once the threaded ends 88 are securely threaded into the flesh of the cervix the nut 92 is spun

down to engage the gauntlet 85 of the blade. In this manner the cervix is very rigidly held. If the speculum is also rigidly held in position the cervix is firmly anchored and the doctor can have both hands free for surgical procedures. Furthermore with threaded skewers in place, spreading of the speculum blades will tend to open the cervical canal.

FIG. 16 illustrates still another embodiment of blade useful with the improved speculum. This blade also has a pair of channels 93 extending along the length thereof (as will be apparent only one such channel is actually needed) Rubber plugs 94 are fitted into the channels at their rearward end. A curved inflatable cuff 96 is provided at the tip end of the blade in fluid communication with one or both of the channels 93. The inwardly facing surface 97 of the inflatable cuff is roughened or provided with a series of knobs for gripping a cervix. This blade is used in substantially the same manner as other blades for a combined speculum and tenaculum. When the blade has been inserted and is positioned adjacent the cervix the blade is inflated with saline solution injected through one of the rubber plugs 94 by a hypodermic syringe 98. Inflation of the opposing curved cuffs 96 brings them in engagement with the cervix for gripping it tightly yet with some gentleness and resiliency. The cuff is deflated with a syringe or merely by snapping out one of the rubber plugs.

Although limited embodiments of vaginal specula and blades therefor have been described and illustrated herein, many modifications and variations will be apparent to one skilled in the art. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A vaginal speculum comprising:

an elongated operating handle having an upper end and a lower end;

a lower blade support tang fixed on the handle;

a slide mounted for movement along the length of the handle;

releasable ratchet means for permitting upward movement of the slide and inhibiting downward movement of the slide;

an upper blade support tang, said upper and lower blade support tangs each adapted to receive and temporarily support a hollow transparent blade;

means for mounting the upper tang on the slide for pivoting about an axis transverse to the direction of movement of the slide;

lever operated means mounted on the slide for pivoting the upper tang towards and away from the lower tang;

resilient means for biasing the upper tang towards the lower tang;

means for adjusting the biasing force of the resilient means; and

means for temporarily latching the upper tang in an open position relative to the lower tang.

2. A vaginal speculum as defined in claim 1 further comprising:

a light source remote from the handle; and

a fiber optic bundle extending from the light source to the handle and having an end at the end of the lower tang.

3. A vaginal speculum as defined in claim 2 further comprising:

- a ferrule fixed on the fiber optic bundle at a selected distance from the end thereof; and means for securing the ferrule to the end of the handle for positioning the end of the fiber optic bundle at the end of the lower tang. 5
4. A vaginal speculum as defined in claim 1 wherein the means for pivoting the upper tang comprises: a lever arm mounted for pivoting on the slide; a lever for pivoting the lever arm; an elevator arm extending between the lever arm and the upper tang, said elevator arm extending along the support arm; a pivot between the elevator arm and the lever arm; and a pivot between the elevator arm and the upper tang, said pivots having axes parallel to the axis of pivoting of the lever arm. 10 15
5. A vaginal speculum as defined in claim 4 wherein the lever pivots about an axis transverse to the direction of movement of the slide and wherein the means for latching comprises a latch member slidable transverse to the direction of movement of the slide for latching the lever in a depressed position. 20
6. A vaginal speculum as defined in claim 4 wherein the ratchet means comprises: 25
- a plurality of ratchet teeth transverse to the handle;
 - a pawl mounted on the slide and engaging the ratchet teeth; and
 - a thumb knob connected to the pawl for disengaging the pawl from the teeth. 30
7. A vaginal speculum as defined in claim 1 wherein the handle is transverse to the lower tang and the slide is below the lower tang for leaving a clear field of view between the tangs, and wherein 35
- the means for mounting the upper tang comprises a support arm fixed on the slide, said support arm curving laterally and upwardly from the slide for leaving a clear field of view between the tangs, and pivot means at the upper end of the support arm for mounting the upper tang. 40
8. A vaginal speculum comprising: an elongated operating handle having an upper end and a lower end; 45
- a lower blade support tang fixed at the top of the handle and approximately normal thereto;
 - a T-shaped slot extending along at least a portion of the length of the handle and being open at its upper end;
 - a plurality of ratchet teeth in the slot extending transverse to the length thereof; 50
 - a slide having a T-shaped cross section mounted in the slot for movement along the length thereof between a lower closed position and an upper open

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- position, the top of the slide being below the top of the lower blade support tang in both the open and closed positions;
- a spring loaded pawl on the slide for permitting upward movement of the slide and inhibiting downward movement of the slide relative to the handle;
- a support arm fixed on the slide and extending laterally and upwardly therefrom to a position above the lower tang and leaving a clear field of view adjacent the upper face of the lower tang;
- a pivot on the upper end of the support arm for pivoting about an axis transverse to the handle;
- a pivot arm mounted on the pivot;
- an upper blade support tang mounted on the pivot arm;
- a thumb lever mounted on top of the slide for pivoting about an axis transverse to the slide;
- a lever arm rigidly connected to the thumb lever for pivoting therewith;
- an elevator arm;
- pivot means for connecting the lower end of the elevator arm to the lever arm;
- pivot means for connecting the upper end of the elevator arm to the pivot arm so that pressure on the thumb lever pivots the upper blade support tang away from the lower blade support tang; and means for resiliently biasing the upper blade support tang towards the lower blade support tang.
9. A vaginal speculum as defined in claim 8 further comprising means for latching the thumb lever in a depressed condition with the upper blade support tang pivoted away from the lower blade support tang.
10. A vaginal speculum as defined in claim 9 wherein the means or latching comprises a latch member mounted on the slide for translation transverse to the direction of movement of the slide and including a portion for engaging the thumb lever.
11. A vaginal speculum as defined in claim 8 further comprising means for temporarily latching the upper tang in an open position relative to the lower tang.
12. A vaginal speculum as defined in claim 11 further comprising:
- a light source remote from the handle;
 - a fiber optic bundle connected to the light source;
 - a ferrule on the fiber optic bundle a selected distance from the end thereof;
 - a passage through the handle and lower blade support tang for receiving an end of the fiber optic bundle; and
 - means for securing the ferrule to the end of the handle for positioning the end of the fiber optic bundle at the end of the lower blade support tang.
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