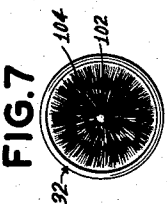
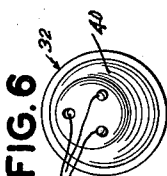
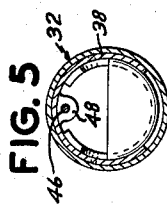
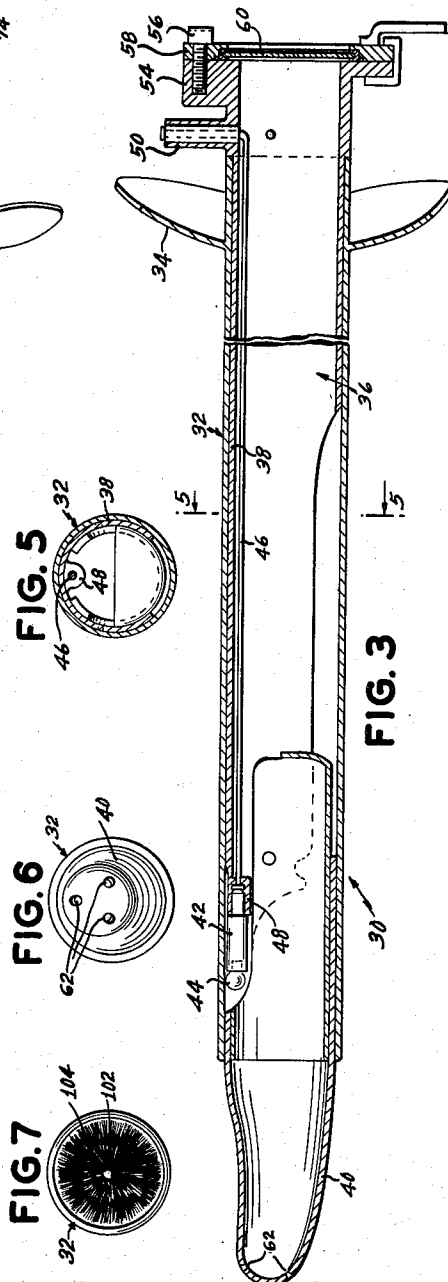
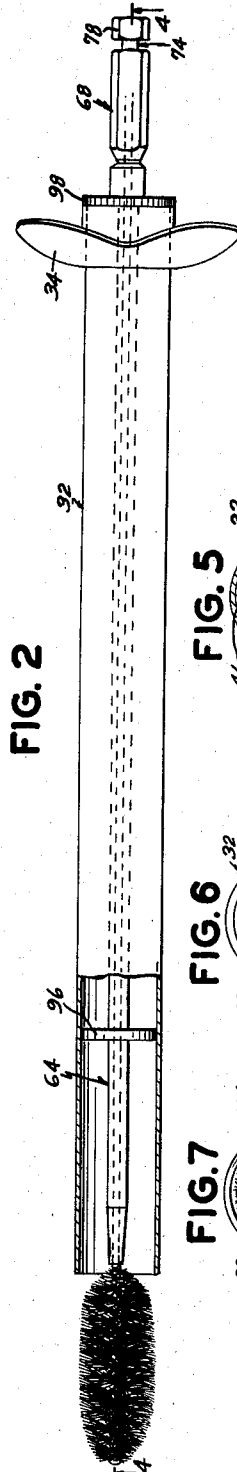
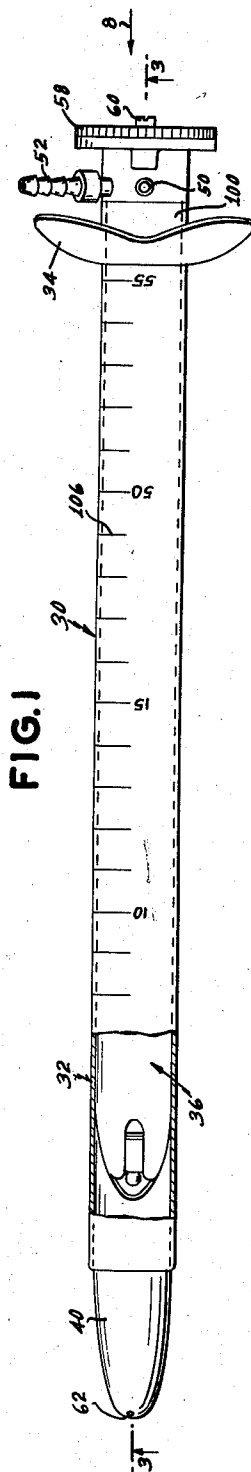


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ABRASIVE CYTOLOGIC INSTRUMENTS

4 Sheets-Sheet 1



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ABRASIVE CYTOLOGIC INSTRUMENTS

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4 Sheets-Sheet 2

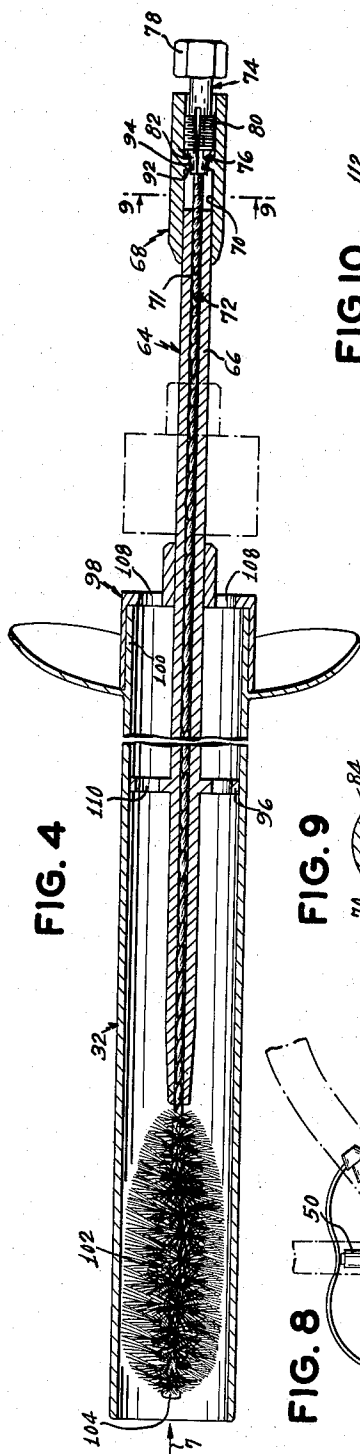


FIG. 4

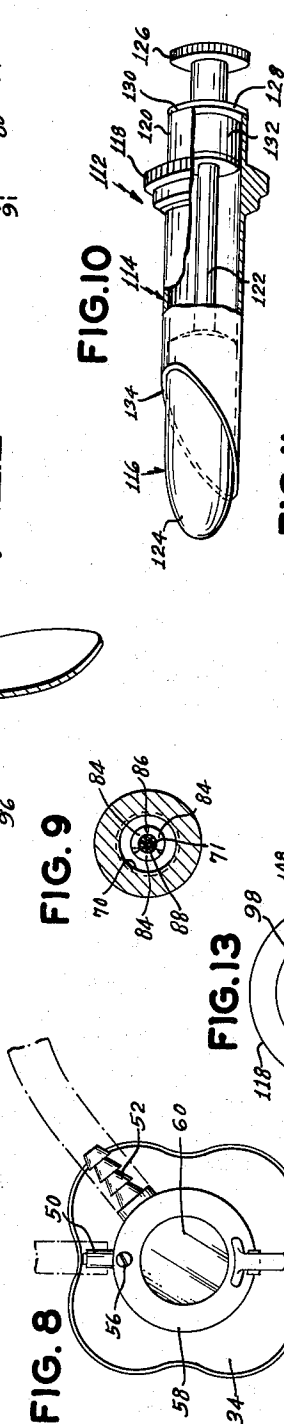


FIG. 8

FIG. 9

FIG. 10

FIG. 13

FIG. 11

FIG. 12

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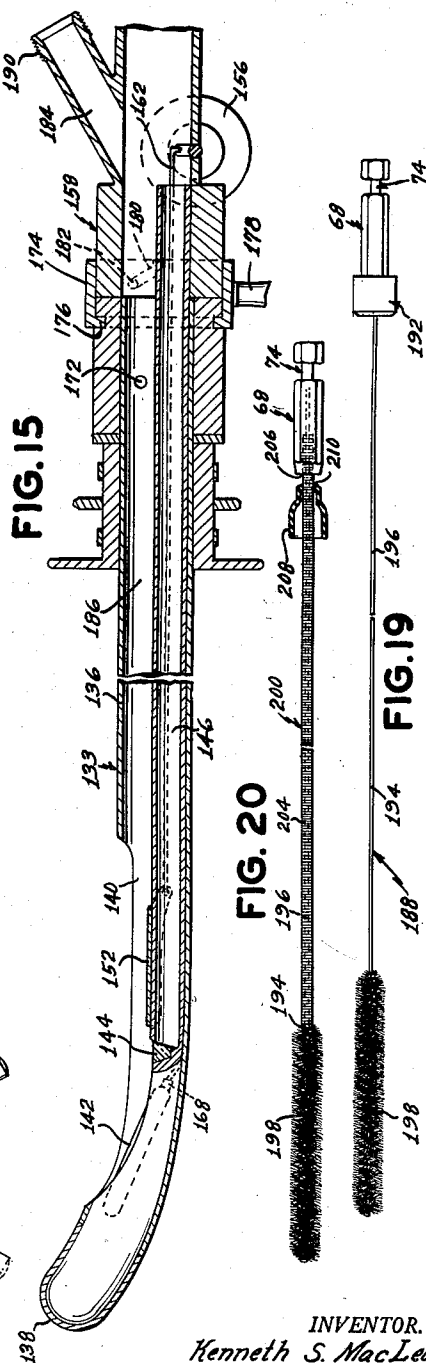
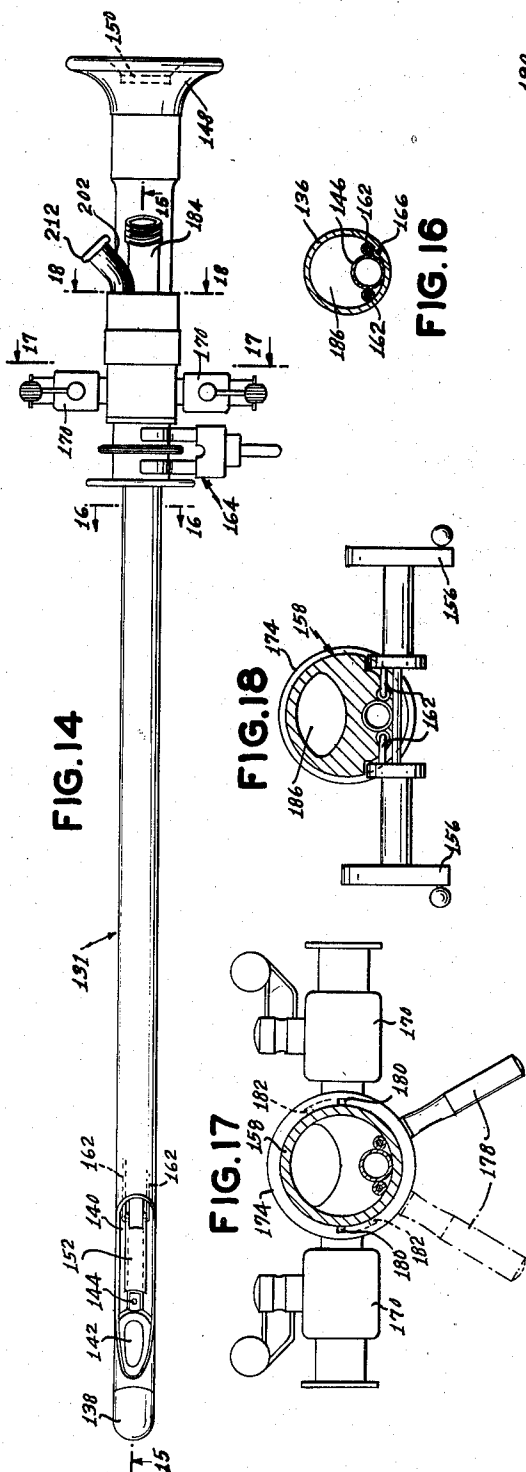
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ABRASIVE CYTOLOGIC INSTRUMENTS

Filed May 20, 1954

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ABRASIVE CYTOLOGIC INSTRUMENTS

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Filed May 20, 1954, Ser. No. 431,068

12 Claims. (Cl. 128—2)

The present invention relates, in general, to cytology, and, in particular, to the conversion of surgical or medical instruments used in the examination of various canals, channels or ducts of the patient's body, into abrasive cytologic instruments for removing cells by abrasion from said parts of the patient's body.

The subject matter of the present application is related to the subject matter of my copending application Serial No. 418,551 filed March 25, 1954, now Patent No. 2,839,049. As stated in my prior application, the diagnostic procedure of obtaining a tissue specimen where cancer is suspected may be quite dangerous if a biopsy is performed on cancerous tissue. While the procedure of exfoliative cytology avoids this danger, said latter procedure does not provide for a positive removal of the cells. This disadvantage may be overcome through the use of the abrasive cytologic brush illustrated and described in said prior application. In accordance with the present invention, and as the primary object thereof, provision is made to apply the diagnostic advantages utilized in the use of an abrasive cytologic brush to surgical and medical instruments, which are otherwise used for insertion into various body openings of the patient for locating various pathological troubles and for permitting curative remedies to be applied to the affected parts, whereby to greatly increase the utility of said instruments by converting them into diagnostic tools for the detection of cancer.

Another object is the provision of means for converting surgical instruments into abrasive cytologic instruments for cancer detection.

A further object is the provision of an abrasive cytologic device which is formed of material inert to bacterial action whereby the device may be readily sterilized for continuous re-use with different patients.

A further object is the provision of a surgical instrument for insertion into a body opening of the patient's body which instrument is formed of a material which obviates the necessity for lubricating the instrument prior to insertion into the patient's body.

The above and other objects, features and advantages of the present invention will be more fully understood from the following description considered in connection with the accompanying illustrative drawings.

In the drawings, which illustrate the best mode presently contemplated by me of carrying out the invention:

Fig. 1 is a side view of a surgical instrument known as a sigmoidoscope;

Fig. 2 is a view similar to Fig. 1 and illustrates the sigmoidoscope converted for use as a diagnostic instrument in an abrasive cytologic procedure for obtaining cells from the patient's body for examination and diagnosis;

Fig. 3 is a sectional view on an enlarged scale taken on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view on a larger scale taken on the line 4—4 of Fig. 2, the instrument being illustrated in another condition thereof;

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Fig. 5 is a sectional view taken on the line 5—5 of Figure 3;

Fig. 6 is an end view of the instrument taken in the direction of the arrow 6 in Figure 3;

Fig. 7 is an end view of the instrument taken in a direction of the arrow 7 in Figure 4;

Fig. 8 is an end view of the instrument taken in the direction of the arrow 8 in Fig. 1;

Fig. 9 is a sectional view taken on the line 9—9 in Fig. 4;

Fig. 10 illustrates an instrument used in the examination of the anus, portions of the instrument being broken away;

Fig. 11 illustrates the instrument of Fig. 10 converted into an abrasive cytologic instrument;

Fig. 12 is a sectional view on the line 12—12 of Figure 11, on a larger scale, with the cytologic brush retracted within the instrument;

Fig. 13 is an end view looking in the direction of the arrow 13 in Figure 12;

Fig. 14 is a side view of a cystoscope;

Fig. 15 is a sectional view on a larger scale taken on the line 15—15 of Fig. 14;

Fig. 16 is a sectional view taken on the line 16—16 of Fig. 14;

Fig. 17 is a sectional view taken on the line 17—17 of Fig. 14;

Fig. 18 is a sectional view taken on the line 18—18 of Fig. 14;

Fig. 19 illustrates an abrasive cytologic device for use with the cystoscope illustrated in Fig. 14;

Fig. 20 illustrates another type of device for use with the cystoscope;

Fig. 21 is a view similar to Fig. 15 and illustrates the cystoscope adapted as an abrasive cytologic instrument;

Fig. 22 is a side view of a bronchoscope;

Fig. 23 is a sectional view on an enlarged scale taken on the line 23—23 of Fig. 22 showing the bronchoscope converted into an abrasive cytologic instrument;

Fig. 24 is a sectional view on a larger scale taken on the line 24—24 of Fig. 22;

Fig. 25 is a sectional view on a larger scale taken on the line 25—25 of Fig. 23;

Fig. 26 is a perspective view of an adapter utilized with the bronchoscope for using the latter as an abrasive cytologic instrument;

Fig. 27 illustrates another abrasive cytologic device which can be used in connection with the various instruments;

Fig. 28 is an end view of the device illustrated in Fig. 27 taken in the direction of arrow 28; and

Fig. 29 illustrates a modification of the abrasive cytologic device illustrated in Fig. 27.

Referring now to Figures 1-9 in detail, reference numeral 30 indicates a surgical instrument technically known as a sigmoidoscope. This instrument, per se, is of well known construction and is fully illustrated and described in Patent No. 1,662,227 to Allyn, dated March 13, 1928. Consequently, a detailed description thereof is deemed to be unnecessary herein. Briefly described, the sigmoidoscope comprises an outer tube or sheath 32 provided adjacent one end thereof with a surrounding cup guard or stop plate 34 adapted to rest upon a table or equivalent support. An obturator 36 is removably mounted within the sheath 32. Said obturator is constituted by an inner tube 38 and a beak or obturator tip 40 which is releasably connected to the tube 38. As described in said patent, provision is made in the tube 38 for a lamp socket 42 for a lamp 44. The circuit for the lamp includes a wire 46 which extends within a relatively small diameter tube 48 provided within the tube 38 through which the wire runs to a nipple 50

which is adapted to receive a suitable coupling by which the wire may be connected to a source of electrical energy. The circuit for the lamp is completed through the tube 38. The tube 38 is also provided with a nipple 52 adapted to receive a suitable coupling by which, it may be connected to a water hose or air hose, as the case may be. At its outer end, the tube is provided with a flange 54 and the screw 56 threaded into the flange serves as a pivotal mounting for a bezel 58 which, in the illustrated position thereof, closes the outer ends of the tube. The bezel is provided with a window or lens 60 for purposes of looking into the tube 38. It will be noted that the obturator 40 is provided with a plurality of apertures 62 at the outer end thereof to provide for the passage of the liquid or air which enters through the nipple 52, outwardly of the instrument 30.

Pursuant to the present invention, the instrument 30 is readily converted into an abrasive cytologic instrument through the use of the abrasive cytologic device 64. As here shown, the device 64 is constituted by an elongated tubular member or brush holder 66, preferably formed of stainless steel or other suitable material and provided at one end thereof with a handle 68, which is preferably force fit about said member at one extremity thereof. It will be noted that the handle extends outwardly beyond the adjacent end of the tubular member 66 and is provided with a bore 70 which communicates with the hollow center of the tube 66. The device 64 includes a brush member 72, and in order to releasably secure the brush member 72 within the tubular holder 66, provision is made for a brush retaining means, here constituted by the chuck 74. As here shown, the chuck 74 is constituted by a split collet 76 which is provided with a head or finger piece 78. The collet 76 is provided with an externally threaded portion 80 for threaded engagement within the internally threaded bore 70 of the handle 68. The collet is also provided with a tapering portion 82 constituted by the split segments 84 which are defined by the splits 86. An opening or bore 68 (Fig. 9) is provided in the chuck for the insertion of one end of the stem 71 of the brush member 72. The handle is provided within the bore 70 with a portion 92 which defines an aperture bounded by a tapering clamping surface 94 which is complementary to the split segments 84. In addition to the foregoing, the tubular holder 66 is provided with an integral spacer portion 96 which is complementary to tube 32. A cap 98, which is adapted to seat on a hilt portion 100 of the outer tube or sheath 32, is mounted on the brush holder 66 for a relative sliding movement.

The stem 71 of the brush member 72 is preferably formed of twisted zinc coated steel wires. At the end thereof opposite the end which is releasably secured in the chuck 74, the stem is provided with the brush bristles 102 which may be formed of either natural or synthetic material. The bristles extend in all directions from the stem. At the bristled end thereof, the stem is capped with a cap 104 preferably formed from a suitable smooth plastic material. It will be understood that the brush member 72 constituted by the stem 71 and the bristles 102 is expendable, serving for only a single patient use after which it is discarded.

A brush may be readily removed from the unit 64 by rotating the chuck 74 in a direction to retract it from the handle 68, sufficiently to withdraw the split segments 84 from the clamping disposition thereof within the handle to release the stem 71 of the brush member 72. Actually, only a few turns of the head 78 are required for the release of the brush stem 90. With the chuck in said partially retracted position thereof, the stem of another brush may be inserted into the opening 88, which is in registry with the bore in the tubular holder 64, and the head 78 may then be rotated in the opposite direction for urging the chuck 74 into the handle 68, the split segments 84 being forced together by the

tapering portion or surface 94 resulting in the clamping of the brush stem in the chuck, to releasably secure the brush member 72 to the brush holder 64. This is preferably done when the brush holder is removed or not in position within the sheath 32.

As is well known to those skilled in the art, a medical or surgical instrument such as the sigmoidoscope 30 is usually provided with a coating of suitable lubricating material which would be applied to the beak 40, as well as to the outer sheath 32, before the instrument is inserted into a body passage or opening. However, this causes the lubricating material to be applied to the parts under examination. While this may be satisfactory for ordinary examination and treatment of the affected part, it is undesirable where cells are to be removed from the body part for microscopic examination. This is due to the fact that the lubricating material used would interfere with the necessary staining of the cells for the microscopic examination thereof. Consequently, another important feature of the present invention is to make the beak 40 of the obturator 36, as well as the shield or sheath 32, of a slippery or smooth material which has an anti-friction effect and does not require any lubricating coating thereon. In this connection the obturator 36 and the sheath 32 are made of polytetrafluoroethylene, which is sold under the commercial name of "Teflon." Instead of being completely made of this material, the beak 40 and the sheath 32 can be made of a suitable metal and provided with an outer covering layer of polytetrafluoroethylene, so as to obviate the necessity for using a lubricant thereupon.

With the instrument 30 assembled, as illustrated in Figs. 1 and 3, it may be inserted to any degree indicated by the graduations 106, into the colon or other body passage which is to be examined. If it is necessary to additionally distend the body part under examination, beyond the degree of distention resulting from the insertion of the obturator beak 40, air under pressure may be inserted into the instrument through the nipple 52 and enter into the body part through the air outlets 62, as is well known to those skilled in the art. The tubular shield 32 may then be left in the body part and the obturator constituted by the inner tube 38 and the beak 40, is then entirely withdrawn from the outer shield 32. Thereafter, if desired, the inner tubular section 38, without the obturator tip 40, may be reinserted in the sheath and the circuit for the lamp 44 connected to a source of energy for permitting a visual examination of the body part through the window or lens 60 in the usual manner. The inner tube 38 is then withdrawn from the shield 32, which remains in the body part, and the abrasive cytologic or brush unit 64 is inserted therein, the cap or spider 98 being engaged on the hilt 100 of the tube 32. The handle 68 is manipulated so that the bristles 102 move outwardly from the position thereof illustrated in Fig. 4 to the position thereof illustrated in Fig. 2. The handle is then rotated to provide for a removal of the surface cells at the part under examination by the abrasive action of the bristles 102. In this connection, it will be noted that viewing openings 108 are provided in the spider 98 and similar viewing openings 110 are provided in the spacing member 96. Consequently, the bristles 102 may be manipulated within the body opening under the direct view of the physician. Thereafter, the brush unit 64 is retracted from the position thereof illustrated in Fig. 2 to the position thereof illustrated in Fig. 4 for withdrawing the bristles into the shield 32. This prevents any inadvertent scraping of the bristles against other body parts, which might result in the loss of the cells which have been removed by the brush, during the withdrawal of the instrument from the patient's body. With the bristles then in the position illustrated in Fig. 4, the shield 32 is withdrawn from the patient's body. The brush unit 64 provided with the cell specimens on the bristles 102, may now be readily removed from the in-

strument by returning the brush unit to the position thereof illustrated in Fig. 2 wherein it projects from the shield 32. The stem 71 may then be grasped at the point where it extends from the tube 66 and the chuck head 78 rotated a few turns to partially retract the chuck for releasing the stem from the holder.

Referring now to Figures 10-13 in detail, there is illustrated a surgical instrument 112 for use in the examination of the anus, which instrument is known as an anoscope. As here shown, the instrument 112 is constituted by a cylindrical outer shield or sheath 114 and an obturator 116. The shield 114 is provided with a knurled finger piece 118 and with a hilt 120. The obturator 116 is provided with a stem 122 which is provided with a head 124, at one end thereof, and is provided with a knurled finger piece 126 at the other end thereof. The stem is also provided with a detent disk 128 adapted to engage the end 130 of the shield 114 and with a guide and spacer member 132. The shield 114 is preferably beveled, as at 134, at the end thereof opposite the end 130 thereof. The shield 114 and the obturator head 124 are each made of polytetrafluoroethylene or provided with a covering layer of said material, or a similar anti-friction material, so as to obviate the necessity for applying a lubricating coating thereto.

Provision is made for an abrasive cytologic or brush unit 64A which is substantially similar to the previously described unit 64, except that the spacer 96 is omitted and the stem 71A and the tubular holder 66A are made shorter than the corresponding brush stem and tubular holder illustrated in figure 4, in order to accommodate the longitudinal dimension of the outer shield 114.

When using the instrument 112, the parts are assembled as illustrated in Figure 10, and the instrument is inserted into the anus, the obturator head 124 serving to distend or dilate the body opening to the required degree. Due to the fact that the obturator head 124 and the outer shield 114 are formed of polytetrafluoroethylene or other anti-friction material, a lubricating coating is not required, as previously indicated. After the instrument is inserted into the patient's body, the shield 114 may be left within the body cavity and the obturator 116 is withdrawn therefrom. The abrasive cytologic unit is then inserted into the shield 114, as illustrated in Fig. 12, the apertured cap or spider 98 thereof being seated on the hilt 120 of the shield 114. The brush handle 68 is then utilized to move the bristled portion 102 of the brush from the position thereof illustrated in Fig. 12 to the position thereof illustrated in Fig. 11, out into the body cavity. The bristles are then manipulated within the body cavity through the manipulation of the handle 68 to provide for a positive removal of the cells by the abrasive action of the bristles. As previously indicated in connection with the sigmoidoscope, the web 98 is provided with the viewing apertures 108 so that this operation may be performed under the direct vision of the physician. Thereafter, the brush unit is retracted to the position thereof illustrated in Fig. 12 and then the shield 114, with the brush unit therein, is removed from the patient's body so as to prevent the inadvertent removal of the cells, which are on the bristles 102, by contact with the patient's body. The brush may then be removed from its holder by operation of the chuck 74 as previously described.

Referring now to Figs. 14-21 in detail, there is illustrated a surgical instrument 131, technically known as a cystoscope, which is converted, pursuant to the present invention, for a positive removal of cells from a body part by means of an abrasive cytologic procedure. In the cystoscope, the obturator and outer shield, of the previously described embodiments, are combined into a single member 133 which has an elongated tubular portion 136, which constitutes an outer shield, and which has a rounded curved end or obturator portion 138 for insertion into a body cavity or opening, and which constitutes an obturator. Pursuant to the previously de-

scribed anti-friction feature of the present invention, the member 133 is formed of polytetrafluoroethylene, or similar anti-friction material, or is provided with a covering layer of said material. Since the cystoscope is a well known surgical instrument for examination and treatment, especially of the urinary bladder, a detailed description thereof is deemed to be unnecessary herein, a general description only being included herein. The member 133 is provided, adjacent the obturator 138 thereof with an opening 140. An elevator device or deflecting device 152 is also mounted adjacent the opening 140 for pivotal movement about the axis of a pivot 154. In order to operate the elevator 152, provision is made for the operating wheels 156-156 provided on a member 158 which contains an eye piece 148 provided with a lens 150. The wheels operate the pivotally mounted levers 160-160, each of which is connected to one end of a control wire 162, the other end of which is connected to the elevator member 152. It will be understood therefore that the wheels or controls 156 operate the elevator member 152 to and from the positions thereof illustrated in Figs. 15 and 21, the latter illustrating the projected operative position of the elevator member. The tubular member 136 also mounts an electrical connector assembly 164, which is adapted to be connected to a source of electrical energy. The assembly is connected through a wire 166 to the socket 168 for the light source 142, the circuit being completed through the instrument itself. Provision is also made for the usual valves 170-170 which are in communication with the tubular member 136, through passageways 172, for controlling the flow of fluid into and out of the instrument, where fluid is being used to dilate the body part under examination. However, it will be understood that in the use of the instrument for effecting a positive removal of cells by abrasion from the body part, water is not inserted into the body part. In order to releasably lock the tube 158 to the tubular member 136, provision is made for a locking ring 174 which is mounted, as by the flange 176 for rotation on the tubular member 136. A handle 178 is provided on the ring 174 for this purpose. The ring 174 is provided with the usual locking slot 180 and a cooperating pin 182 is provided at the inner end of the tubular member 158. Consequently, it will be understood that the handle 178 can be moved to and from the full and dotted line positions thereof illustrated in Fig. 17, for effecting the connection and disengagement of the tubular member 158 to the tubular member 136 in the usual manner.

Pursuant to the present invention, the cystoscope 131 is converted for functioning as an abrasive cytologic device or instrument. In this connection, it will be noted that the usual inlet tube 184 which communicates with the elongated passageway 186 in the tubular member 136, which passageway at the other end thereof is in communication with the opening 140, is adapted to receive an abrasive cytologic unit 188. As here shown, the tubular extension 184 is externally threaded, as at 190, for receiving an internally threaded locking nut 192 provided on the brush assembly 188. In addition to the locking nut 192, the brush assembly 188 includes the brush member 194 constituted by the stem 196 provided with the bristles 198. A handle 68, as in the previously described embodiments, here serves as a brush holder and is provided with the previously described chuck 74 which is adapted to engage the brush stem 196 to clamp the latter into the handle 68, as previously described. In the present embodiment, the locking nut 192 is mounted for free rotary movement on the handle 68, the locking nut being provided with a flange 193 which is engaged in a circular recess 195 provided in the periphery of the handle 68 of the present embodiment.

The brush unit 194 may be readily inserted into the instrument by inserting the brush stem 196 through the opening 140 into the passageway 186 and through said

passageway and through the tubular extension 184 into the handle 68 for releasable engagement therein by the chuck 74.

When using the cystoscope as an abrasive cytologic instrument, the locking nut 192 is originally disengaged from the tubular extension 184 and the handle 68 is pulled outwardly so as to retract the brush bristles 198 into the passageway 186. The instrument may then be inserted in the usual manner into the body passageway or body cavity. In this connection, it will be understood that the tubular member 133 is also formed of polytetrafluoroethylene or other anti-friction material, or may be provided with a covering of said material so as to obviate the necessity for providing any lubrication thereon. After the instrument is properly disposed within the patient's body, the elevator 152 may be raised to the piston thereof illustrated in Fig. 21 and the handle 68 moved in a direction to carry it toward the tubular extension 184. This will result in the movement of the bristled portion of the brush outwardly of the passageway 186 and the bristles will ride up on the elevator 152 and be disposed outwardly of the instrument as illustrated in Fig. 21. The locking member 192 may then be threadedly secured to the tubular extension 184 and the handle may now be manipulated by rotation to provide for the positive removal by abrasion of cell specimens from the adjacent body part. In this connection, it will be noted that said manipulation of the brush unit 188 may be accomplished under the direct vision of the physician who can look through the eye piece 148 into the adjacent end of the viewing tube 146, and through the prism 144, provided at the other end thereof, out through the opening 140. At the termination of the procedure for removing the cells, the locking nut 192 is disengaged from the tubular extension 184 and the bristled portion of the brush is completely retracted into the passageway 186, the elevator 152 being depressed to facilitate said retraction of the brush bristles. As in the prior embodiments, the cells removed by the brush bristles are protected against inadvertent loss by rubbing of the bristles against parts of the patient's body during withdrawal of the instrument, by means of the tubular member 136 which serves as a shield therefore during said removal of the instrument from the patient's body. The brush may then be readily removed from the instrument, after the latter has been removed from the patient's body, for obtaining the cells for the study thereof.

In lieu of the brush unit 188, the brush or abrasive cytologic unit 200, illustrated in Fig. 20, may be used with the cystoscope to adapt the latter for an abrasive cytologic procedure. More specifically, it will be noted that the cystoscope is ordinarily provided with a second tubular outlet 202 which also communicates with the passageway 186. The brush unit 200 is also provided with a brush member 194 having a stem 196 provided at one end thereof with the bristles 198. However, in the present embodiment, provision is made for a flexible tubular holder 204 which is secured at one end thereof, as at 206, to a handle 68 which is provided with the previously described chuck 74. Therefore, it will be understood that the stem 196 may be inserted through the flexible shield 204 into the handle for releasable securement thereto by the chuck 74 in the previously described manner. A rubber nipple 208 is secured to the flexible shield 204 as at 210.

In view of the foregoing, it will be apparent that the abrasive cytologic unit 200 may be readily provided on the cystoscope 131 by initially removing the brush 194 from the tubular holder 204. The tubular holder may then be readily inserted through the tubular extension 202 into the passageway 186 until the rubber nipple 208 engages on the complementary shaped connector portion 212 of the outlet 202. This provides an air tight and water tight seal at the connector 212. The brush stem 196 may then be inserted through the opening 140 into the free end

of the flexible holder 204 and through the latter into the handle 68 for clamping engagement by the clutch 74 as previously described. The handle may then be retracted to retract the brush bristles into the passageway 186 and the cystoscope may then be inserted into the body passage, as previously described, for a positive removal by abrasion of cells at the surface of the body part under the direct vision of the physician.

Referring now to Figs. 22-26 in detail, the present invention is illustrated in connection with a bronchoscope 214 to provide for an abrasive cytologic procedure within the lungs. In this connection, it will be understood that the bronchoscope 214, per se, is of standard and well known construction, and therefore detailed description thereof is considered to be unnecessary. The bronchoscope is provided with a tubular member 216 which is provided at one end thereof with an obturator portion 218 so that the obturator and tubular shield are integrated in a single member, as in the case of the cystoscope. The bronchoscope is also provided with an opening 220 formed in the tubular member 216 and a light source 222 is suitably mounted therein adjacent the opening. The light source is connected by the wire 224 to an electrical connector 226 for connection to a suitable source of electrical energy. The circuit is completed through the instrument itself in the usual manner. The tube 216 is closed by a cap 228 which is provided with a handle 230. The cap 228 is apertured therethrough having an apertured portion 232 of larger diameter and an apertured portion 234, of smaller diameter which portions are in communication with each other, as best illustrated in Fig. 25. The apertured portion 234 is in alignment with a lateral bulge 236 in the tube 216 which extends longitudinally thereof to provide a viewing passage therethrough. A plug 238 is mounted within the apertured portion 232. More specifically, it will be noted that the plug 238 is provided with a flanged head 240 and with a stem 242 which stem extends into the apertured portion 232. The stem 242 and the head 240 are provided with a linear surface 244 so as to clear the aperture 234, as best illustrated in Fig. 25, so as not to obstruct the viewing passageway 236. The plug 238 is provided with a longitudinal passageway 246 therein. The bronchoscope 216 is also provided with a tubular extension 248 for the insertion of air therein, when required.

In order to convert the bronchoscope for an abrasive cytologic procedure provision is made for an abrasive cytologic unit or assembly 250. As here shown, said unit comprises a tubular holder 252 which is provided with the previously described handle 68, the latter being provided with a chuck 74. The brush 254 has a stem 256 provided at one end thereof with the bristles 258. The brush stem extends through the holder 250 into the handle 68 for releasable clamping engagement by the chuck 74, as previously described. When the brush is assembled with the bronchoscope, as illustrated in Fig. 23, the handle is retracted for withdrawing the bristles 258 into the tubular member 216 which serves as a shield therefor. The instrument is now ready for insertion into a body opening. In this connection, it will be understood that the tubular member 216 is formed of polytetrafluoroethylene, or other anti-friction material, or is formed of metal and provided with a polytetrafluoroethylene covering, so as to obviate the necessity for using a lubricating material, as previously described. The instrument may then be readily inserted into the patient's body opening and the handle 68 moved toward the instrument for moving the brush bristles 258 outwardly thereof. In this connection, it will be noted that the diameter of the obturator portion 218 of the instrument is much less than the diameter of the remaining part of the tubular member 216, so that the bristles 258 may be readily moved outwardly of the instrument through the opening 220 therein. The handle 68 may then be rotated for rotating the brush unit, as indicated by the arrows 260, to perform the operation for a

positive removal of the cells from the adjacent part of the patient's body. The handle is then retracted from the instrument to withdraw the brush bristles completely into the shield 216, so that when the bronchoscope is removed from the patient's body the cells removed by the bristles 258 will not be dislodged therefrom by contact with the patient's body. The brush may then be removed from the bronchoscope, as previously described, and the cells then submitted to the usual examination.

In each of the foregoing embodiments, I have illustrated and described a bristled brush as the abrasive cytologic device for the removal of cells. As previously indicated, the bristled brush is expendable and is discarded after each patient use, after the removal of the cells therefrom. Pursuant to another aspect of the present invention, provision may be made for an abrasive cytologic device which may be continuously re-used and need not be discarded after each patient use. More particularly, and as best illustrated in Figs. 27 and 28, provision is made for an abrasive cytologic device 262 constituted by a stem 264, preferably formed of a suitable metal, which is provided at one end thereof with an abrasive cytologic head 266. The head 266 is formed of a chemically inert material which will not sustain bacterial growth and which may be readily sterilized for re-use. As presently constructed, the head 266 is formed of polytetrafluoroethylene. However, it will be understood that any other plastic which is suitable for the purpose may be used.

In order to adapt the head 266 for an abrasive cytologic operation, the latter is provided with a plurality of radially extending segments 268. It will be noted from Fig. 27 that the segments 268 are spaced from each other longitudinally of the head 266, and, as best illustrated in Fig. 28, the adjacent segments are separated by notches 270. The notches 270 define abrading surfaces 272 at the opposite ends of each segment. Consequently, it will be readily apparent that as the stem 264 is rotated, the abrasive surfaces 272 will provide for a positive removal by an abrasive action of cells at the surface of an adjacent body part.

Fig. 29 illustrates a modification of the re-usable abrasive device 262. As illustrated in Fig. 29 provision is made for an abrasive device 274 in which the stem 264A and the abrading or abrasive head 266A are integral with each other, the entire unit being formed preferably of polytetrafluoroethylene or other suitable plastic. The abrasive device 274 operates in the same manner as the abrasive device 262.

It will be understood that it is within the scope of the present invention to provide each of the embodiments of Figs. 2, 11, 21 and 23 with an abrasive device having an abrading head formed of chemically inert material as in Figs. 27 or 29, so as to provide for a re-usable abrading device. In each case the abrading device would be dimensioned so as to enter the body part with which the particular instrument is used. In the case of the bronchoscope, the diameter of the bronchus, into which the abrading device has to be inserted, is approximately $\frac{1}{4}$ inch. Consequently, the maximum diameter of the abrading device, through the segments thereof would be dimensioned to enter the bronchus. The diameter of the stem 264 or 264A is less than the diameter through the segments, as illustrated in Figs. 27-29. A polytetrafluoroethylene stem of the required diameter is sufficiently flexible to permit the device 274 to flex so as to be forced out of the fenestra of the bronchoscope. However, the larger diameter through the abrading segments provides sufficient rigidity outwardly of the stem to effect the abrading action.

While the previously described embodiments illustrate means for converting a sigmoidoscope, an anoscope, a cystoscope, and a bronchoscope into an abrasive cytologic instrument, through the use of an abrasive cytologic device unit in connection with the outer tubular member of each instrument, which serves as a shield for the cytologic device, it will be understood that it is within

the scope of the present invention to adapt or convert similar surgical instruments for use as abrasive cytologic instruments. For example, and not by way of limitation, a culdescope, an oesophagoscope and a gastroscope may be converted in the described manner into an abrasive cytologic instrument.

While I have shown and described the preferred embodiments of my invention, it will be understood that various changes may be made in the present invention without departing from the underlying idea or principles of the invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. In a surgical instrument provided with a viewing tube for examination of a body part, an abrasive cytologic device having an abrading part mounted for projection from and retraction into said instrument and means accessible externally of said instrument for manipulating said abrading part within said body part, said abrading part having a substantially rigid abrading head formed of chemically inert material, and having a plurality of abrading surfaces.

2. An abrasive cytologic device for a sigmoidoscope or the like comprising a stem provided with abrasive means at one end thereof, a holder in which said stem is mounted, means for securing said stem in said holder, guide means provided on said holder for slideable engagement with the sigmoidoscope, and a spider, slideably mounted on the holder for attaching said device to the sigmoidoscope.

3. An abrasive cytologic device for a sigmoidoscope or the like comprising a stem provided with abrasive means at one end thereof, a holder in which said stem is mounted, means for securing said stem in said holder, guide means provided on said holder for slideable engagement with the sigmoidoscope, and a spider, slideably mounted on the holder for attaching said device to the sigmoidoscope, said securing means comprising a chuck for separably securing said stem to said holder.

4. An abrasive cytologic device for a sigmoidoscope or the like comprising a stem provided with abrasive means at one end thereof, a holder in which said stem is mounted, means for securing said stem in said holder, guide means provided on said holder for slideable engagement with the sigmoidoscope, and a spider, slideably mounted on the holder for attaching said device to the sigmoidoscope, said securing means comprising a chuck for separably securing said stem to said holder, and said chuck being provided with a collet having an externally threaded portion and a tapered portion, and a bore having a complementary internally threaded portion and a complementary tapered portion, said bore coacting with said collet for separably mounting said stem.

5. An abrasive cytologic instrument comprising a body member positionable within a patient's body, said body member being formed of polytetrafluoroethylene whereby to obviate the need to apply lubrication to said body member, a stem extending through said body member, an abrasive means extending longitudinally along one end of said stem and secured in fixed relation thereto, for removing cells by abrasion from said body, and a handle for manipulating said abrasive means and in which said stem is separably mounted, whereby said abrasive means may be removed from the handle and discarded.

6. An abrasive cytologic instrument comprising a body member positionable within a patient's body, said body member being formed of polytetrafluoroethylene whereby to obviate the need to apply lubrication to said body member, a stem extending through said body member, an abrasive means extending longitudinally along one end of said stem and secured in fixed relation thereto, for removing cells by abrasion from said body, and a handle for manipulating said abrasive means and in

which said stem is separably mounted, whereby said abrasive means may be removed from the handle and discarded, said abrasive means comprising a brush having transversely extending bristles.

7. An abrasive cytologic device adapted to be inserted in a tubular member, comprising a stem provided with abrasive means at one end thereof for removing cells by abrasion from the membrane immediately below the exfoliative level of a patient's body part and for collecting said cells, a holder in which said stem is removably mounted, a handle mounted to said holder at one end thereof, means mounted on said handle for releasably securing said stem within said holder, whereby said stem may be readily removed from said holder and discarded, and means for releasably securing said device to said tubular member.

8. An abrasive cytologic device adapted to be inserted in a tubular member, comprising a stem provided with abrasive means at one end thereof for removing cells by abrasion from the membrane immediately below the exfoliative level of a patient's body part and for collecting said cells, a holder in which said stem is removably mounted, a handle mounted to said holder at one end thereof, means mounted on said handle for releasably securing said stem within said holder, whereby said stem may be readily removed from said holder and discarded, and means for releasably securing said device to said tubular member, said abrasive means having a substantially rigid abrading head formed of chemically inert material and having a plurality of abrading surfaces.

9. An abrasive cytologic device for an anoscope or the like, comprising a stem provided with abrasive means at one end thereof for removing cells by abrasion from the membrane immediately below the exfoliative level of a patient's body part and for collecting said cells, a holder in which said stem is removably mounted, a handle mounted to said holder at one end thereof, means mounted on said handle for releasably securing said stem within said holder, whereby said stem may be readily removed from said holder and discarded, and a spider slidably mounted on said holder for attaching said device to the anoscope.

10. An abrasive cytologic device for a cystoscope or the like, comprising a stem provided with abrasive means at one end thereof for removing cells by abrasion from the membrane immediately below the exfoliative level of a patient's body part and for collecting said cells, a flexible holder in which said stem is removably mounted, a handle mounted to said holder at one end thereof, means mounted on said handle for releasably securing said stem within said holder, whereby said stem may be readily removed from said holder and discarded, and a coupling element provided on said holder for attaching said device to the cystoscope, said coupling element pro-

viding a fluid-tight seal between said device and the cystoscope.

11. An abrasive cytologic device for a bronchoscope or the like, comprising a stem provided with abrasive means at one end thereof for removing cells by abrasion from the membrane immediately below the exfoliative level of a patient's body part and for collecting said cells, a holder in which said stem is removably mounted, a handle mounted to said holder at one end thereof, means mounted on said handle for releasably securing said stem within said holder, whereby said stem may be readily removed from said holder and discarded, and a plug mounted for relative movement on said holder for mounting said device in the bronchoscope.

12. An abrasive cytologic device for a bronchoscope or the like, comprising a stem provided with abrasive means at one end thereof for removing cells by abrasion from the membrane immediately below the exfoliative level of a patient's body part and for collecting said cells, a holder in which said stem is removably mounted, a handle mounted to said holder at one end thereof, means mounted on said handle for releasably securing said stem within said holder, whereby said stem may be readily removed from said holder and discarded, and a plug mounted for relative movement on said holder for mounting said device in the bronchoscope, said plug having viewing apertures therein formed to expose the viewing passage of the bronchoscope.

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