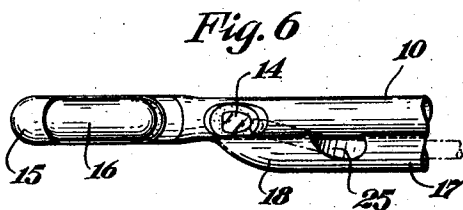
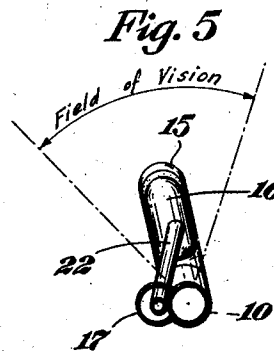
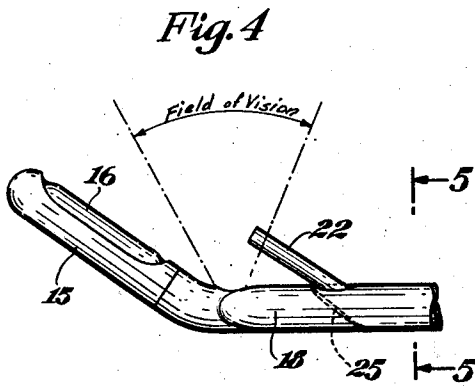
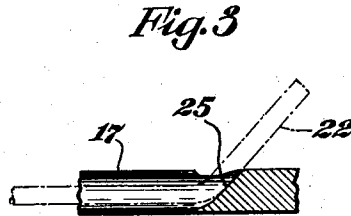
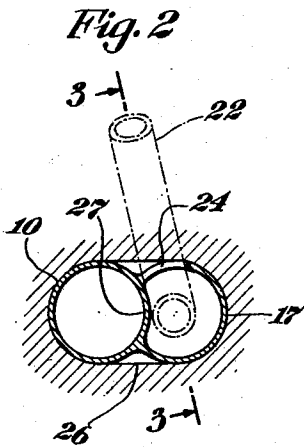
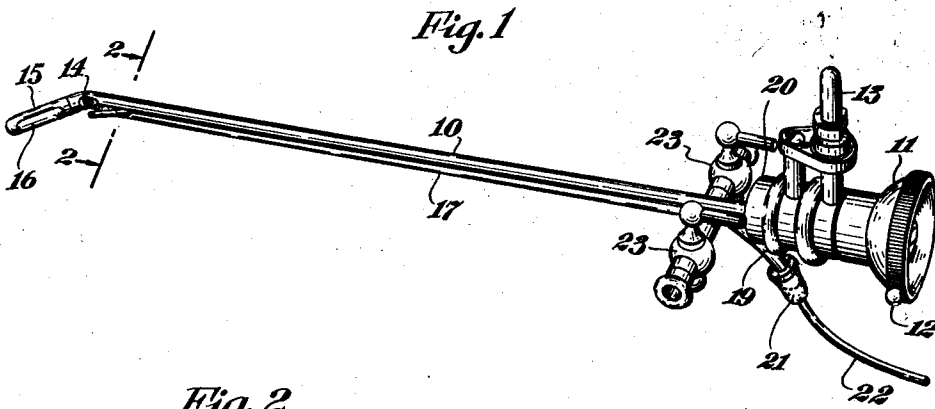


June 24, 1930.

R. H. WAPPLER
SMALL SIZED CYSTOSCOPE

1,767,025

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SMALL-SIZED CYSTOSCOPE

Application filed June 15, 1929. Serial No. 371,125.

My present invention relates generally to surgical instruments, and has particular reference to cystoscopes.

The great progress made during the past twenty-five years in genito-urinary surgery has given rise to the realization that many abnormal conditions can be traced to early childhood. For this reason, there has been a growing necessity for small-sized cystoscopic instruments.

It is an object of my present invention to provide a small-sized cystoscope designed primarily for use in connection with the surgical examination and treatment of children. It will be understood, however, that my invention is by no means limited to such a use since the advantages achieved by my present device may find wide applicability either singly or in conjunction with each other in the diagnostic-instrument art in general.

One of the main objects of my present invention is to provide a cystoscope of extreme smallness and of maximum smoothness so that the employment thereof, whether in connection with children or with exceptionally small body cavities in general, is rendered feasible and unobtrusive.

One of the features of my invention lies in the provision of a structure whose characteristics have enabled me to keep the peripheral size down to barely eleven millimeters, the smallest corresponding size heretofore employed, so far as I know, being in the nature of thirteen millimeters.

Another feature of my invention lies in the provision of a cystoscope which is totally devoid of any mechanical movements or articulated parts or portions, such as deflectors or the like, the possibility of compactness and smoothness being thereby greatly enhanced.

An important feature of my invention lies in the combination, in accordance with a novel arrangement, of a telescope-lamp tube and a catheter or instrument tube, whereby the employment of an obturator is rendered unnecessary, and wherein danger of traumatization is nevertheless minimized.

In general, it is a feature of my inven-

tion to provide a structure which affords the same vision, the same illumination, and the same freedom and facility of operation as has heretofore been achieved with instruments of this general character but of larger size and devoid of the advantageous characteristics of my present instrument.

Briefly, it is an essential feature of my present invention to provide a telescope tube and a catheter tube in mutual adjacency with the axes of the tubes in a plane substantially perpendicular to the axis of the lateral field of vision commanded by the telescope; and the provision of other arrangements which will be more fully appreciated after this specification is read and which contribute to the achievement of the advantages illustratively outlined hereinbefore.

For the attainment of the foregoing objects and such other objects as may hereinafter appear or be pointed out, I have constructed a device embodying the features of my invention and illustrated in the accompanying drawings wherein—

Figure 1 is a perspective view of my improved small-sized cystoscope, this view being practically normal size;

Figure 2 is a cross-sectional view on an enlarged scale taken substantially along the line 2—2 of Figure 1 and showing the manner in which the instrument stretches the cavity wall through which it is being inserted; the dot and dash lines indicating the approximate disposition of a catheter or similar instrumentality;

Figure 3 is a cross-sectional view taken substantially along the line 3—3 of Figure 2 but upon a smaller scale.

Figure 4 is a side view of the forward end of my instrument, on an enlarged scale with respect to Figure 1, but on a smaller scale than Figure 2;

Figure 5 is a view taken substantially in the direction 5—5 of Figure 4; and

Figure 6 is a plan view of Figure 4.

I provide a substantially circular telescope tube 10 at the rear end of which I arrange the usual accessories such as the eyepiece 11 with the marker 12, and the binding

post or terminal 13 for the electrical source of energy for the lamp. Near the extreme forward end of the telescope tube 10 I provide an objective 14 which is preferably arranged in a lateral fenestra and commands a lateral and substantially conical field of vision. The extreme tip of the telescope tube constitutes a lamp-accommodating extension 15, the lamp 16 being mounted therein in the usual manner and being electrically connected with the terminal 13 by leads not shown in the drawings.

Alongside of the tube 10 I provide a catheter tube 17 which is also substantially circular but which is integrally formed upon the tube 10 in such close adjacency that a portion of the circular cross-section is sliced off as shown most clearly in Figure 2. Stated otherwise, the conjoint cross-sectional configuration of the elongated hollow member formed of the tubes 10 and 17 is defined by two circles slightly overlapping. This configuration might also be defined as being substantially elliptical with a medial depression formed on each of the longer sides of the ellipse.

The extreme forward tip of the tube 17 is sealed and attenuated as at 18 and is caused to merge in a smooth and gradual manner with the forward portion of the tube 10, preferably immediately behind the lamp extension 15. The rear end of the tube 17 may advantageously be curved downwardly as at 19 (Figure 1) and a workmanlike and staunch result is attained by soldering or suitably attaching this curved portion 19 to the enlarged rear end 20 of the tube 10. Over the extreme rear or inlet end of the tube 17 I prefer to provide a resilient sleeve 21, of rubber or the like, this sleeve having a longitudinal opening which is normally retained shut by virtue of the resilience of the sleeve material but which stretches and allows the free passage therethrough of an operating instrumentality such as the catheter 22.

Adjacent to the rear portion of the catheter tube 17 I also provide inlet and outlet openings for irrigation purposes, these openings being diametrically opposed and communicating with the interior of the tube 17. Pet-cocks 23 of wellknown character control these inlet and outlet openings.

The main features of my present invention will be most clearly appreciated upon reference to Figures 2-6. The objective of the telescope tube commands a lateral and conical field of vision substantially as indicated, and the lamp extension 15 is bent upwardly toward this field of vision.

Upon viewing Figure 5, I will point out that cystoscopes of larger size have customarily been provided with the catheter tube arranged above the telescope tube, thereby causing the catheter to advance, directly

from the front, into the field of vision. The proper deflection of the catheter has in such cases been accomplished by suitable mechanical deflectors or the like controllable from the rear of the instrument as a whole. In accordance with my present invention, the catheter tube is arranged alongside of the telescope tube so that the axis thereof and the axis of the telescope tube lie in a plane which is substantially perpendicular to the axis of the lateral field of vision, as distinguished from a plane coinciding or parallel to the field of vision axis.

As a result of this arrangement, most clearly illustrated in Figure 5, I am enabled to provide the outlet fenestra of the catheter tube 17 almost in its entirety within the bounds of the depression formed on one of the longer sides of the elliptical cross-section. This fenestra 24 is clearly shown in Figure 2 and it is to be noted that it lies substantially in the same plane as the objective 14 of the telescope tube. The fenestra 24 is arranged adjacent to the objective 14 but slightly behind the latter, as seen most clearly in Figure 6, and faces the field of vision, whereby the catheter enters the latter obliquely from the side thereof instead of from the front thereof.

To facilitate the proper guidance and curving of the forward end of the catheter as it emerges from the catheter tube 17, I provide an inclined abutment or surface 25 immediately behind the forward sealed tip 18 of the catheter tube. This surface lies substantially in a plane perpendicular to the dot and dash depicted catheter 22 of Figure 2, and attention is specifically directed to the direction 3-3 in which Figure 3 is taken.

As a result of the foregoing arrangement, the lateral field of vision is not only efficiently illuminated but the catheter tube is effectively guided obliquely toward the axis thereof without the necessity for the employment of any mechanical deflecting medium.

The extremely advantageous characteristics of my instrument will now be more fully understood. In Figure 2 I have shown the manner in which the instrument stretches the wall 26 of a minute yet stretchable body cavity. It is to be noted that the telescope tube 10 renders the employment of an obturator unnecessary and effectually prevents the cavity wall from dangerously hugging the fenestrated wall of the catheter tube 17. As a result, my instrument may be inserted and removed from a cavity without any danger of traumatization or the like by undesired contact of the edges of the fenestra 24 with the wall of the cavity.

Furthermore, compactness is achieved by virtue of the foregoing arrangement since the major axis of the elliptical cross-section need not be equal to twice the diameter of

one tube. This slicing of one portion of the catheter tube to provide the cross-section of overlapping circles previously mentioned has the further advantage of providing space for irrigation purposes. It is to be noted that the inlet and outlet openings controlled by the pet-cocks 23 are arranged along the small axis of the elliptical cross-section. These inlet and outlet openings are arranged closely adjacent to the medial partition 27 constituted of the inner portion of the telescope tube 10. Accordingly, the catheter tube 17 may be satisfactorily employed at one and the same time for purposes of operation and also for purposes of irrigation. The resilient sleeve 21 serves to seal the rear end of the catheter tube to allow such irrigation to be carried into effect.

It will thus be seen that I have provided an instrument of extreme simplicity, of minimum size and maximum smoothness, and which nevertheless renders feasible the examination and treatment of body cavities, and particularly the bladder, in as efficient a manner as has heretofore been carried out by instruments of larger size and greater complexity. It will be understood that the tube 17, referred to herein and in the appended claims as a catheter tube, is not necessarily restricted to this use but may accommodate operating instrumentalities of any suitable flexible character.

Furthermore, it will be seen that changes in the details herein described and illustrated for the purpose of explaining the nature of my invention may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative, and not in a limiting sense.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. A cystoscope comprising a pair of adjacent tubes, one a telescope tube having an objective which commands a lateral field of vision, the other a catheter tube, said tubes being arranged side by side with their axes in a plane substantially perpendicular to the axis of said field of vision.

2. A cystoscope comprising a pair of adjacent tubes, one a telescope tube having an objective which commands a lateral field of vision, the other a catheter tube, said tubes being arranged side by side with their axes in a plane substantially perpendicular to the axis of said field of vision, and said catheter tube having an outlet fenestra adjacent to said field of vision and facing the latter.

3. A cystoscope comprising a pair of adjacent tubes, one a telescope tube having an objective which commands a lateral field of vision, the other a catheter tube, said tubes

being arranged side by side with their axes in a plane substantially perpendicular to the axis of said field of vision, said catheter tube having an outlet fenestra facing said field of vision and provided with an inclined abutment behind said fenestra for guiding a catheter obliquely into said field of vision.

4. A cystoscope comprising a pair of adjacent tubes, one a telescope tube having a lamp at its end and an objective behind the lamp and commanding a lateral field of vision, the other a catheter tube having an outlet fenestra facing said field of vision, said tubes being arranged side by side with their axes in a plane substantially perpendicular to the axis of said field of vision, and the tip of the catheter tube being sealed and merging with the telescope tube behind said lamp.

5. A cystoscope comprising a pair of integrally formed adjacent tubes jointly conforming in cross-section to circles which slightly overlap, one of the tubes having a lamp-accommodating extension at its forward end and an objective behind said extension and commanding a lateral field of vision, the other tube being a catheter tube having its forward end sealed and attenuated and merging with the first-named tube behind said extension, said tubes being arranged with their axes in a plane substantially perpendicular to the axis of said field of vision, the lamp extension being bent toward said field, and the catheter tube having an outlet fenestra behind the sealed end thereof and facing said field of vision, said outlet fenestra lying practically in its entirety within the depression formed by said overlapping circles.

6. A cystoscope comprising a pair of integrally formed adjacent tubes jointly conforming in cross-section to circles which slightly overlap, one of the tubes being a telescope having an objective behind the tip thereof and commanding a lateral field of vision, the other tube being a catheter tube having its forward end sealed and attenuated and merging with the telescope tube, said tubes being arranged with their axes in a plane substantially perpendicular to the axis of said field of vision, the catheter tube having an outlet fenestra behind the sealed end thereof and adjacent to said objective, said fenestra lying practically in its entirety within the depression formed at the juncture of said overlapping circles.

7. A cystoscope comprising a pair of integrally formed adjacent tubes jointly conforming in cross-section to circles which slightly overlap, one of the tubes having a lamp-accommodating extension at its forward end and an objective behind said extension and commanding a lateral field of vision, the other tube being a catheter tube having its forward end sealed and atten-

uated and merging with the first-named tube behind said extension, said tubes being arranged with their axes in a plane substantially perpendicular to the axis of said field of vision, the lamp extension being bent toward said field, and the catheter tube having an outlet fenestra behind the sealed end thereof and facing said field of vision.

8. In a diagnostic instrument for insertion into a constricted yet stretchable body cavity, the combination with a substantially circular telescope tube having an objective near its forward end, said objective commanding a lateral field of vision, of a substantially circular catheter tube alongside of the telescope tube and having an outlet fenestra adjacent to said objective and facing said field, said tubes having their axes parallel and in a plane substantially perpendicular to the axis of said field of vision, whereby the telescope tube will prevent the cavity wall from hugging the fenestrated wall of the catheter tube during the insertion of the instrument.

9. In a diagnostic instrument for insertion into a constricted yet stretchable body cavity, the combination with a substantially circular telescope tube having an objective near its forward end, said objective commanding a lateral field of vision, of a substantially circular catheter tube alongside of the telescope tube and having an outlet fenestra adjacent to said objective and facing said field, said tubes being integrally formed in slightly overlapping relationship whereby the conjoint exterior cross-section is substantially elliptical with a depression on each long side thereof, said tubes having their axes parallel and in a plane substantially perpendicular to the axis of said field of vision, and said outlet fenestra lying almost entirely in one of said depressions, whereby the instrument may be inserted without obturation of said catheter tube, the telescope tube preventing the stretched cavity wall from hugging the fenestrated wall of said catheter tube.

10. In a cystoscope, a pair of adjacent tubes, one a telescope-lamp tube having a lateral objective-fenestra at its forward end, the other a catheter tube having a lateral outlet fenestra at its forward end, said fenestræ being arranged in mutual adjacency alongside of each other and substantially in a common plane.

11. In a cystoscope, a hollow elongated member of substantially elliptical cross-section provided with a medial partition substantially along the short axis of the ellipse which defines two adjacent tubes, one of the tubes being a telescope-lamp tube with a lateral objective fenestra, the other a catheter tube with a lateral outlet fenestra; said fenestræ being arranged

alongside of each other on one of the longer sides of the ellipse.

12. In a cystoscope, a hollow elongated member of substantially elliptical cross-section provided with a medial partition substantially along the short axis of the ellipse which defines two adjacent tubes, one of the tubes being a telescope-lamp tube with a lateral objective fenestra, the other a catheter tube with a lateral outlet fenestra; said fenestræ being arranged alongside of each other on one of the longer sides of the ellipse; and said catheter tube being provided at its rear end with opposed inlet and outlet openings for irrigation, said last-named openings lying along the short axis of the ellipse adjacent to said partition.

In witness whereof I have signed and sealed this specification this 12 day of June, 1929.

REINHOLD H. WAPPLER.