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CYSTOSCOPE AND THE LIKE

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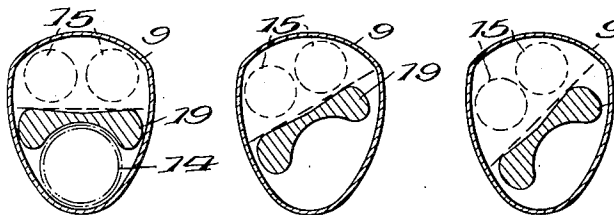
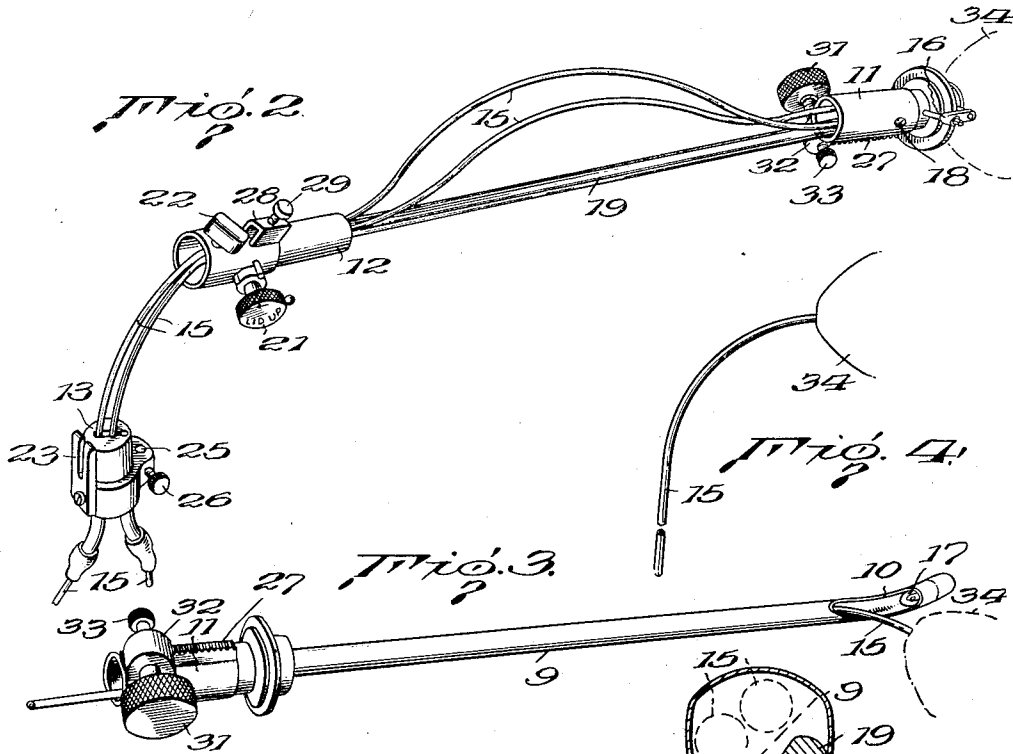
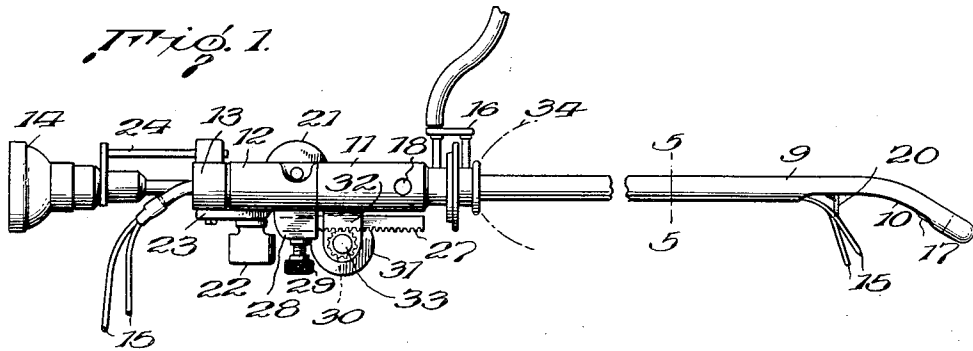


Fig. 5

Fig. 6

Fig. 7

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CYSTOSCOPE AND THE LIKE

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5 Claims. (Cl. 128—7)

This invention relates to cystoscopes and the like; and it comprises a cystoscope having operating instruments, a removable telescope and a plate between the operating instruments and the telescope and serving to guide the instruments, a sheath having an interior width at the point of location of the plate not substantially greater than the width of the plate, but greater than the interior width at the point of location of the telescope, positioning means at one end of the cystoscope for operating the plate and means for rotating the positioning means with respect to the sheath after removal of the telescope to turn the plate, whereby the plate may be lowered into a narrower portion of the interior away from frictional engagement with the operating instruments and then be removed, after which the sheath may be moved longitudinally relative to the operating instruments without friction therewith to leave the instruments in position; all as more fully hereinafter set forth and as claimed.

Devices of the character to which this invention relates are intended to be passed into cavities of the body such as the bladder. Such cavities are restricted in nature and hence these devices must be exceedingly small in diameter with their internal parts compactly arranged.

Cystoscopes, in their present form, usually consist of a tube or sheath with a window at one end, a telescope lying along the bottom of the sheath and having its objective lens located in the window, associated operating instruments adapted to protrude through the window and extend along the top of the sheath and a thin plate extending in the sheath between the telescope and operating instruments and serving to guide the instruments and to support a movable deflector positioned under the window. The deflector aids in manipulation of operating devices when the cystoscope is within the body.

Operating devices adapted to be used in connection with a cystoscope are many; choice of one or more instruments depending upon the technique employed by the operator and also on the nature of the operation being performed. Some of these instruments are larger in diameter than others and in cystoscopes adapted for universal practice, or in cystoscopes designed for use on children, larger instruments frequently fill substantially the entire space between the deflector plate and the top of the sheath. As a result, longitudinal movement of the sheath relative to the instruments is hampered by friction.

However, in cystoscopes, for one reason or

another, the occasion frequently arises for the operator, after performing an operation, to remove the sheath from a patient while leaving behind one or more indwelling devices. For example, after performing double catheterization of the ureters by means of a cystoscope inserted into the bladder through the urethra, it is frequently desirable to leave both catheters indwelling in the ureters while removing the rest of the apparatus from the body of the patient.

In the prior art, there exists no practical instrument by which such a maneuver may be positively performed. The very nature of the instrument has hampered the development of a cystoscope in which the sheath may be removed without danger of dislodging indwelling instruments. Either the sheath has been of so large a diameter as to preclude its use or, in instruments of smaller diameter, it has been impossible to prevent frictional engagement between the operating instruments and the other parts of the apparatus. This dislodgement of instruments intended to be retained, even when occasional, has resulted in making the operation uncertain and difficult to perform.

In U. S. Letters Patent No. 1,901,731 issued to me March 14, 1933, I have described and claimed an improved cystoscope adapted for universal use; that is, for use with any of the operating instruments employed in present day cystoscopes. As described in the specification of that patent, by means of the new construction therein shown and claimed, I have widened the area within the body in which cystoscopes may be used and also widened the area within the body which may be viewed by the operator while performing an operation. This has been accomplished without increasing the diameter of the sheath.

However, I find that with mine, and other prior cystoscopes, after performing various operations it is desirable to withdraw the cystoscope sheath and other mechanisms from the body of the patient and leave behind indwelling operating tools such as catheters or the like. Up till now, this has been an uncertain maneuver for two reasons. If an attempt be made to withdraw the deflector mechanism prior to removal of the sheath from the patient, the friction between the deflector plate and the operating instruments frequently causes the latter to be dragged along with the plate and dislodged from their position in the body. If an attempt be made to remove the sheath from the patient without first removing the deflector, the same friction is set up as before but, in addition, there is friction between

the sheath and the instruments whereby the withdrawal is made more difficult.

The present invention is an improvement over prior cystoscopes in that means are provided which, after removal of the telescope, the deflector plate may be turned within the sheath and moved away and out of contact with the indwelling instruments before removal of the plate. The deflector plate may be subsequently removed without friction with operating instruments and such removal frees the entire space within the sheath other than that occupied by the operating instruments. Hence the sheath may be withdrawn without binding against the indwelling instruments and without danger of dislodging them. Furthermore, the cystoscope of the present invention, while having a sheath of smaller diameter than heretofore employed, is adapted for performance of all the operations which previously required the use of larger calibered instruments.

In the accompanying drawing, in which similar reference numerals designate corresponding parts throughout the several views, I have shown one specific embodiment of my invention.

Fig. 1 is an elevation of my improved cystoscope showing the same in operating position in the urethra of a male patient. In this position the small end of the sheath protrudes within the bladder (not shown).

Fig. 2 is a perspective view showing the position of the deflector mechanism and closure plug during one stage of their removal with the sheath and operating instruments still within the patient's organ;

Fig. 3 is a perspective view showing the deflector mechanism and closure plug removed from the sheath and the sheath withdrawn from the urethra and ready to be slipped from the end of an operating instrument while the latter remains within the patient;

Fig. 4 shows the operating instrument retained within and protruding from the male organ after complete removal of the sheath and allied parts;

Fig. 5 is a cross section taken through the line 5-5 of Fig. 1 showing the operating instruments, deflector plate and telescope in operating position within the sheath;

Fig. 6 is a similar cross section showing the position of the internal parts after removal of the telescope and partial rotation of the deflector mechanism;

Fig. 7 shows a further stage of rotation of the deflecting mechanism preparatory to lowering it into the narrow portion of the sheath; and

Fig. 8 illustrates the deflector plate immediately prior to its removal showing the additional space within the sheath afforded the operating instruments by the lowering of the plate.

In the drawing reference character 9 indicates a tubular sheath of oval cross section having a window 10 at one end and an enlarged cylindrical housing 11 at the opposite end. Housing 11 accommodates a moveable cylindrical member 12 provided at the rear with a removable closure plug 13 suitably bored to receive a telescope 14 and one or more instruments 15. If it is desired to use a single operating instrument of relatively large diameter, plug 13 may be provided with a single large channel to accommodate the instrument instead of the double channel illustrated in Fig. 2. The housing 11 carries the usual electrical contact 16 for lighting a lamp 17 in the window 10. An opening 18 is provided for attachment of irrigating valves of the usual construction (not shown).

A deflector plate 19 is attached at one end to member 12 and carries at the other end a movable deflector 20 controlled by knurled wheel 21 carried on the member 12. The closure plug 13 is seated in the rear of member 12 and the two detachably held together by means of key 22 on member 12 locking forked member 23 on the plug. The telescope 14 is provided with a guiding peg 24 fitting in a slot 25 in closure plug 13 and the slot 25 is provided with a set screw 26 for securing the peg 24 at any desired position. Longitudinal motion of the member 12 with respect to the housing 11 is controlled by means of a rack 27 detachably secured to plug 12 by means of rack carrier 28 and set screw 29. Motion is imparted to rack 27 by a pinion 30 housed in guideway 32 and operated by knurled wheel 31. When the rack is detached from the carrier, member 12 is free to rotate within the housing. The rack may be secured in any desired position in the guideway 32 by means of set screw 33.

While the above described rack and pinion form an advantageous arrangement serving to impart longitudinal motion to the member 12 the invention is not limited to such construction as obviously other suitable means may be employed for accomplishing the same result.

For illustrative purposes the cystoscope has been diagrammatically shown in various relations to a male organ 34.

As illustrated best in Figs. 1 and 5 when the cystoscope is completely assembled and in position for performing urological operations within the bladder, the member 12 is inserted within the housing 11 with the rack 27 held in the carrier 28 by set screw 29 and engaging the pinion 30 in the guideway 32. The closure plug 13 is locked within the rear of member 12 by means of key 22. The telescope 14 and operating instruments 15 are inserted through suitable bores in the closure plug 13, cylindrical member 12 and housing 11 and lie within the sheath 9 in the position shown in Fig. 5. The objective lens of the telescope is positioned upright under the window by means of guide peg 24 registering with slot 25 and the deflector plate 19 is positioned in the proper plane by means of the rack 27 registering with guideway 32.

When the desired operation within the bladder has been performed and it is desired to leave one or more operating instruments indwelling within the patient, the following technique is employed: the set screw 26 is loosened and the telescope 14 withdrawn leaving space in the sheath 9 under the plate 19. After unlocking the key 23, closure plug 13 is moved from the rear end of the member 12 and slipped off the end of the operating instruments. Then, after lowering the deflector 20, the wheel 31 is turned until the member 12 moves rearwardly and is nearly disengaged from the housing 11, after which the set screw 29 is loosened and the direction of the rotation of the wheel 31 is reversed causing the rack 27 to leave the carrier 28 and travel forward within the guideway 32 to the position shown in Figs. 2 and 3 where it is unable to interfere with rotation of member 12. Member 12 is next slightly rotated with the result that the deflector plate 19 is turned within the sheath to the position shown in Fig. 7. The member 12 may then be freed from engagement with housing 11 and lowered until the plate 19 assumes a position along the narrow portion of the sheath out of the way of instruments 15 as shown in Fig. 8. The plate 19 and member 12 are then free to be with-

drawn from the housing 11 and sheath 9 as shown in Fig. 2 without danger of dislodging the operating instruments from their position within the patient. For illustrative purposes, I have shown the plug 13 depending from the instruments prior to its removal in Fig. 2. However, for convenience, in actual operation the plug 13 is usually removed entirely from the instruments before removing the member 12 and associated parts. After removal of the deflector plate, the sheath 9 may be removed from the patient without danger of dislodging the instruments 15 from their position in the bladder. The instruments 15 during removal of plug 13 and sheath 9 may be given manual support or slight positive pressure. After removal of the sheath as shown in Fig. 3, the latter may be unthreaded from the instruments 15. This being accomplished, one or more instruments are allowed to remain undisturbed within the organ as shown diagrammatically in Fig. 4.

The provision of means to withdraw a cystoscope from the body of a patient without disturbing indwelling instruments has been accomplished without limiting the utility of the instrument. The cystoscope of the present invention is adapted when equipped with proper operating instruments for ureteral catheterization, excision of tumors of the bladder, snaring of papillomata for diagnosis and therapy, crushing and removal of calculi, removing of foreign bodies, dilatation of ureters, destruction of tumors with high frequency currents, exploratory punctures of cysts and the use of endovesical cutting instruments. It will therefore be seen that the new features of construction of the instrument have not sacrificed its flexibility in operation.

In the accompanying drawing I have illustrated the cystoscope only in relation to its use upon a man and I have shown only one type of operating instrument. It is to be understood that the invention is not so limited but that it is adapted to be employed on both male and female patients and with various operative devices.

What I claim is:

1. In a cystoscope comprising operating instruments, a removable telescope and a plate between the operating instruments and the telescope and serving to guide said instruments, a sheath with a rounded interior having a width at the point of location of said plate not substantially greater than the width of the plate but greater than the width of said interior at the point of location of the telescope, means at one end of the cystoscope to which said plate is attached and means for rotating said last named means with respect to said sheath after removal of the telescope to turn said plate, whereby said plate may be lowered into a more narrow portion of the interior away from frictional engagement with said operating instruments and then removed, after which the sheath may be moved longitudinally relative to the operating instruments without friction therewith.

2. A cystoscope comprising an oval sheath fenestrated at the tip, operating instruments extending within the sheath along the top, a removable telescope extending within the sheath along the bottom, a plate between said operating instruments and said telescope and serving to guide said instruments, said sheath having an interior width at the point of location of said plate not substantially greater than the width of said plate but greater than the width of the interior below said point, means at one end of the

cystoscope to which said plate is attached and means for rotating said last named means with respect to said sheath after removal of the telescope to turn said plate partially into the space in the sheath occupied by the telescope prior to removal of the latter, whereby said plate may be lowered into a more narrow portion of the interior away from frictional engagement with said operating instruments and then removed, after which the sheath may be moved longitudinally relative to the operating instruments without friction therewith.

3. In a cystoscope, a sheath enclosing operating tools, a telescope and a tool manipulating device, the telescope being removable, means at one end of the cystoscope to which the tool manipulating device is attached and means for rotating said last named means with respect to the sheath to turn the said tool manipulating device inside the sheath so that it may be moved away from said tools and into the space occupied by the telescope after the latter is removed, and be then withdrawn from the sheath, whereby the said tools are released from frictional engagement with the walls of said sheath and with the said manipulating device, and whereby the sheath may be moved longitudinally relative to the tools to leave one or more of them in operating position.

4. A cystoscope comprising a sheath having a window at one end, a cylindrical housing at the other end, that portion of the sheath between said window and said housing being oval in cross section, a bored member fitting and adapted to be moved in said housing in a direction parallel to the longitudinal axis of said sheath and to be rotated in either direction, a removable telescope extending through said member and housing into said sheath along the narrowest portion of the oval, a plate carrying a deflector for guiding operating tools, said plate being fastened at one end to said member and extending within said sheath adjacent and above said telescope along the intermediate portion of the oval, operating tools extending through a bore in said member into the sheath adjacent and above said plate along the widest portion of the oval and protruding through said window, a rack detachably secured to said member and a guideway and pinion carried by said housing, said rack, guideway and pinion cooperating to form means for moving said member longitudinally within said housing, whereby after said telescope is removed from the member and sheath said member may be detached from said rack, rotated until said plate occupies a portion of the space within the sheath left by removal of the telescope and then withdrawn from said housing after which said plate may be lowered within the sheath to occupy the narrowest portion thereof and withdrawn without friction with said operating tools.

5. A cystoscope comprising a sheath having a window at one end and a cylindrical housing at the other end, that portion of the sheath between said window and said housing being oval in cross section, a bored member fitting and adapted to be moved in said housing in a direction parallel to the longitudinal axis of said sheath and to be rotated in either direction, a removable telescope extending through said member and housing into said sheath along the narrowest portion of the oval, a plate carrying at one end a deflector for operating tools, said plate being fastened at the other end to said member and extending within said sheath adjacent and above said tele-

scope along the intermediate portion of said oval, operating tools extending through a bore in said member into the sheath adjacent and above said guiding shaft along the widest portion of the oval and protruding through said window, a rack carried by said member and a guideway and pinion carried by said housing, said pinion and guideway cooperating with said rack to form

means for moving said member longitudinally within said housing and means for detaching said rack from said member whereby after removal of the telescope from said member and sheath the member may be rotated within said housing to cause the plate to move into the space occupied by the telescope prior to removal of the latter.

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