

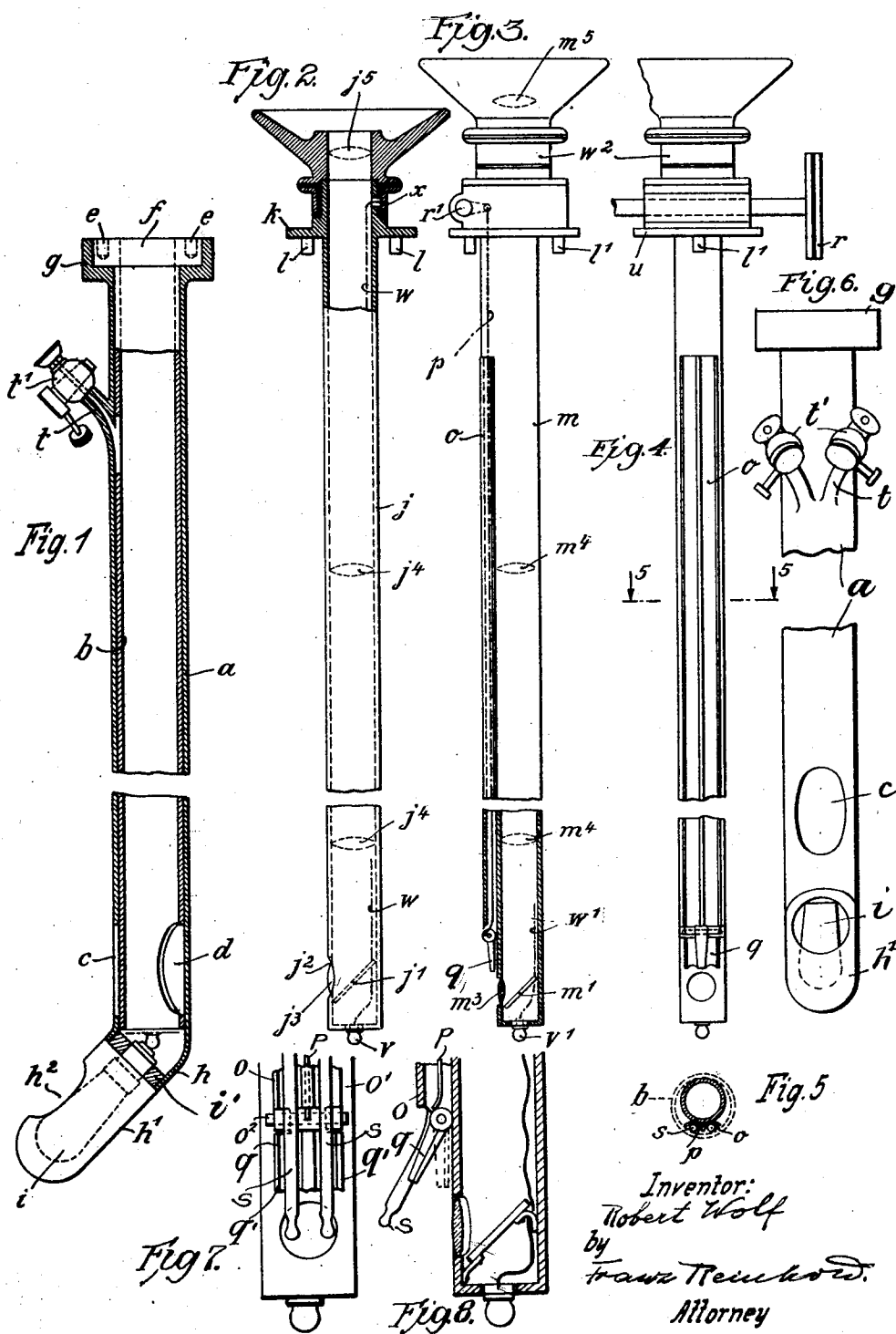
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CYSTOSCOPE AND SIMILAR INSTRUMENT

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CYSTOSCOPE AND SIMILAR INSTRUMENT.

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My invention relates to improvements in cystoscopes and similar instruments intended to be used for making examinations of or treating inner parts of the body. Apparatus of this class, such as are now in use, comprise a tube provided, at the end to be introduced into the cavity to be examined or treated, with an incandescent lamp and a fenestral opening through which the cavity is inspected by means of the optical system or treated by means of suitable apparatus. It is desirable to provide means for closing the said opening, first, because, the protruding edges of the opening are liable to scratch or otherwise injure the patient when introducing or withdrawing the instrument, and, second, because the liquid flowing from the cavity and through the tube would trouble the physician. In apparatus such as are now in use only one of the said conditions is fulfilled. In one type of the instrument the opening is closed before introducing the tube so that the edges do not injure the patient, but the closing member is removed before inserting the lens system or the apparatus for treating the cavity, so that the instrument is temporarily open and permits the liquid to flow out. In another type of the instrument apparatus for treating the cavity are mounted within the tube, and the lens system is adapted to be inserted into the said tube, a valve being provided at the rear end of the outer tube, which is automatically closed when withdrawing the lens system, so that the liquid can not flow out. However, it is impossible to close the fenestral opening, so that the edges thereof are liable to injure the patient.

One of the objects of the improvements is to provide an instrument which answers to both of the said requirements, and with this object in view I provide closing means adapted to be operated from without for opening or closing the opening when the lens system or other apparatus are within the tube or withdrawn therefrom. In the preferred construction the said closing means are in the form of an inner pipe closely fitting within the outer tube and adapted to open or close the said opening and to receive the lens system or a lens system and apparatus for treating the cavity of the body, or a spout for cleansing the said cavity. In one embodiment of the invention the said pipe is formed near its inner end with an opening corresponding to the said opening of the

outer tube and adapted to be brought into or out of position for covering the same by turning the pipe about its axis.

Another object of the improvements is to provide an instrument which can be readily disinfected. As is known to those skilled in the art, only those parts of the instrument can be disinfected by boiling which do not contain any part of the electric system or the lens system, which parts must be disinfected in a less convenient way for example by means of alcohol. In my improved system I provide the electric leads supplying current to the incandescent lamp on the member carrying the lens system, and I mount the incandescent lamp within the bent inner end of the outer tube so as to be readily removed therefrom. Therefore I am enabled to disinfect the outer tube by boiling after removing the lamp therefrom, so that only the member carrying the lens system and the leads must be disinfected by alcohol.

In order that my invention be more clearly understood an example embodying the same has been shown in the accompanying drawing, in which the same reference characters have been used in all of the views to indicate corresponding parts. In said drawing:—

Fig. 1 is a longitudinal section showing the outer tube and the pipe for closing the fenestral opening of the tube mounted therein,

Fig. 2 is an elevation showing the lens system adapted to be introduced into the said pipe,

Fig. 3 is a similar elevation showing a lens system combined with apparatus for treating the cavity, Fig. 4 is a side view seen from the left in Fig. 3,

Fig. 5 is a section taken on the line 5—5 of Fig. 4,

Fig. 6 is an elevation looking from the left in Fig. 1,

Fig. 7 is a detail view on an enlarged scale showing the end of Fig. 3 on an enlarged scale, and

Fig. 8 is a section taken on the line 8—8 of Fig. 7.

In the example shown in the drawing my improved instrument comprises an outer tube *a* of circular cross-section having a fenestral opening *c*. Within the said tube an inner pipe *b* is telescopically mounted which is formed at a part corresponding to

the opening *c* with an opening *d*. At its rear end the pipe *b* carries a head *f* formed with two bores *e* and fitted within a cap *g* provided at the rear end of the tube *a*, and the pipe *b* is adapted to be turned within the tube *a* about its axis by means of a suitable handle engaging in the bores *e*. At this front end the tube *a* is formed with a bent portion *h* having a cap *h*¹ screwed or otherwise secured thereto, which portion is provided at the side on which the opening *c* is positioned with an opening *h*², and which encloses an incandescent lamp *i*. Near the rear end of the tube there are two tubular members *t* each including a valve *t*¹ and adapted for insertion of a catheter there-through.

The optical system is mounted within a tube *j* of circular cross-section which nicely fits within the pipe *b*. The tube *j* carries a head *k* provided with pins *l* adapted to register with the bores *e*. The optical system consists of a mirror *j*¹ located at the rear of a lateral window *j*² and lenses *j*³, *j*⁴ and *j*⁵. To the end face of the tube an insulated contact piece *v* is secured which is electrically connected with a lead *w* passed internally through the tube *j*, the socket terminal being electrically connected through a bushing *i*¹ carrying the same with the tube *h*. At the rear end of the tube there is an insulated ring *x* connected with the lead *w*. The flange *k* and the insulated ring *x* are adapted to be connected to the terminals of a source of electric energy, in which case the current is supplied to the lamp from one of the said terminals through the ring *x*, the lead *w*, the insulated contact piece *v*, the filament of the incandescent lamp, the socket terminal thereof, the metallic bushing *i*¹, the tube *a*, the pipe *b*, the tube *j*, the flange *k* thereof and the second terminal of the source of electric energy.

In Figs. 3, 4 and 5 I have shown by way of example an instrument for treating the cavity. As shown the instrument comprises a tube *m* including an optical system *m*¹ and *m*³, *m*⁴, *m*⁵. Near the rear end the tube *m* carries a flange *u* provided with pins *l*¹ adapted to register with the bores *e*, and to the front face an insulated contact *v*¹ is secured which is connected with a lead *w*¹ passed internally through the tube *m* and to an insulated contact ring *w*². To the tube a roof shaped rib *o* is secured the side portions of which are curved outwardly and away from the tube thus providing longitudinal grooves *o*¹ accommodating a pair of catheters *s*. Between the median part of the rib and the tube *m* there is a longitudinal passage providing a guide for a wire *p*. At its ends the rib *o* is provided with a pair of eyes *o*² to which a plate or arm *q* is hinged, which arm is formed with two grooves *q*¹ located in alignment with the

grooves *o*¹. The wire *p* is secured with one end to the arm *q* eccentrically of the axis of said hinge, and with its opposite end to a crank arm *r*¹ connected with a hand operated disk *r*. By turning the disk *r* the wire *p* is shifted inwardly or outwardly thus rocking the arm *q* from the position shown in Fig. 8 in full lines into the position shown in dotted lines, or back again. The dimensions of the tube *m* are such that the said tube and its roof shaped rib *o* nicely fit within the pipe *b* as is shown in Fig. 5 in dotted lines, and that, after inserting the tube into the pipe *b* in the manner to be presently described the arm *q* is in position for being placed at the rear of the opening *c*. After the tube *m* has been inserted into the pipe *b* and turned into the position with the arm *q* at the rear of the fenestral opening *c* the catheters *s* can be inserted through the tubular members *t* and the channels provided by the grooves *o*¹ and the wall of the pipe *b*, the inner ends of the catheters being supported on the grooved portions *q*¹ of the arm *q*.

In addition to the apparatus so far described other known or novel apparatus may be provided which are likewise adapted to be passed into the pipe *b* in the same way as the tube *m*.

The operation of the instrument is as follows: For examining a cavity the tube *j* carrying the optical system is inserted into the pipe *b*, until the mirror *j*¹ is at the rear of the opening *d* located in the position shown in Fig. 1 in which the opening *c* is closed. Now the instrument is introduced into the cavity. As the opening *c* is closed its edges do not injure the patient, and no liquid can flow from the cavity and through the instrument. Now the tube *j* and the pipe *b* are turned so that the openings *c* and *d* and the mirror *j*¹ are in line with each other, and the physician can examine the cavity. Should the physician find that the liquid such as urine is dim he turns the tubes *j* and *b* for closing the opening *c*, and he withdraws the lens system and replaces the same by a cleansing instrument, whereupon the opening *c* is again opened. After cleansing the fenestral opening *c* is closed, and the cleansing apparatus is removed and replaced for example by the apparatus *m* shown in Figs. 3 to 5, which is likewise turned after insertion of the instrument for opening the fenestral opening *c*. Now the physician inserts the catheters *s* through the tubular members *t* and the channels provided between the grooves *o*¹ and the pipe *b*, until the inner ends of the catheters bear on the arm *q*. By turning the disk *r* the arm *q* is rocked outwardly and the inner ends of the catheters projected into the bladder and passed into the ureters. Thus urine is separately taken

from each ureter and kidney, so that by testing the separate proofs of urine the physician can ascertain which one of the kidneys is sick.

5 From the foregoing description it will be understood that the fenestral opening *c* of the tube *a* can be closed and opened, whether or not the optical system or another apparatus has been inserted. Therefore, when
10 introducing the tube the fenestral opening is closed, so that its edges do not injure the patient, and that no liquid can flow from the cavity and through the tube. The optical system or other apparatus can be inserted into or retracted from the tube when the fenestral opening is closed. Furthermore, the tube can be disinfected by boiling after withdrawing the optical system and dismounting the lamp, so that only the lens system or other apparatus including the lead
20 must be disinfected by alcohol or the like. The means for closing the fenestral opening are simple in form, so that they can easily be cleaned.

25 While in describing the invention reference has been made to a particular example embodying the same, I wish it to be understood that my invention is not limited to the construction shown in the drawing, and that various changes may be made in the construction of the parts within the scope of my invention.

I claim:—

35 1. In an instrument of the class described, the combination, with a tube open at one end and having a fenestral opening at its opposite end, of apparatus adapted to be inserted into said tube for physician's work through said fenestral opening and constructed for preventing when inserted the flow of liquid
40 out of said tube, and a gate separate from said apparatus and adapted to be moved when said apparatus has been inserted into position for covering and uncovering said fenestral opening.

45 2. In an instrument of the class described, the combination, with a tube open at one end and having a fenestral opening at its opposite end, of a pipe mounted within said tube for covering and uncovering said fenestral opening, an apparatus separate from said pipe and adapted to be inserted into said pipe for physician's work through said fenestral opening, and constructed for preventing the flow of liquid out of said tube,
50 said pipe being adapted to be operated for covering and uncovering said fenestral opening when said apparatus has been inserted.

60 3. In an instrument of the class described,

the combination, with a tube open at one end and having a fenestral opening at its opposite end, of a pipe rotatable within said tube and having an opening adapted to be brought into and out of position for covering
65 said fenestral opening by turning the pipe about its axis, and apparatus adapted to be inserted into said pipe for physician's work through said fenestral opening, and constructed for preventing when inserted
70 the flow of liquid out of said tube, said pipe being adapted to be rotated for covering and uncovering said fenestral opening when said apparatus has been inserted.

4. In an instrument of the class described, 75 the combination, with a tube open at one end and having a fenestral opening at its opposite end, of a pipe rotatable within said tube and having an opening adapted to be brought into and out of position for covering said fenestral opening by turning the pipe about its axis, and apparatus adapted to be inserted into said pipe for physician's work through said fenestral opening and to be
80 connected with said pipe for turning the same about its axis, said apparatus being constructed for preventing when inserted the flow of liquid out of said tube.

5. In an instrument of the class described, 90 the combination, with a tube open at one end and having a fenestral opening at its opposite end, of an electrical lamp within said tube at the end thereof adjacent to said fenestral opening, said lamp having a contact accessible from the hollow of the tube, an optical system and its mounting removable within said tube and having an insulated contact in position for loose engagement with said lamp contact, and an electric
95 lead connected with said contact on the optical system and its mounting.

6. In an instrument of the class described, 105 the combination, with a tube open at one end and having a fenestral opening at its opposite end, a pipe within said tube for covering and uncovering the fenestral opening thereof, an electric lamp within said tube at the end thereof adjacent to said fenestral opening, said lamp having a contact accessible from the hollow of the pipe, an optical system adapted to be inserted into said pipe and having an insulated contact in position for loose engagement with said lamp contact, and an electric lead connected with said
110 contact on the optical system.

In testimony whereof I hereunto affix my signature.

ROBERT WOLF.