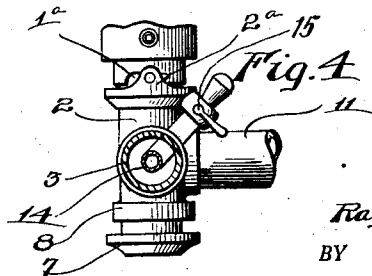
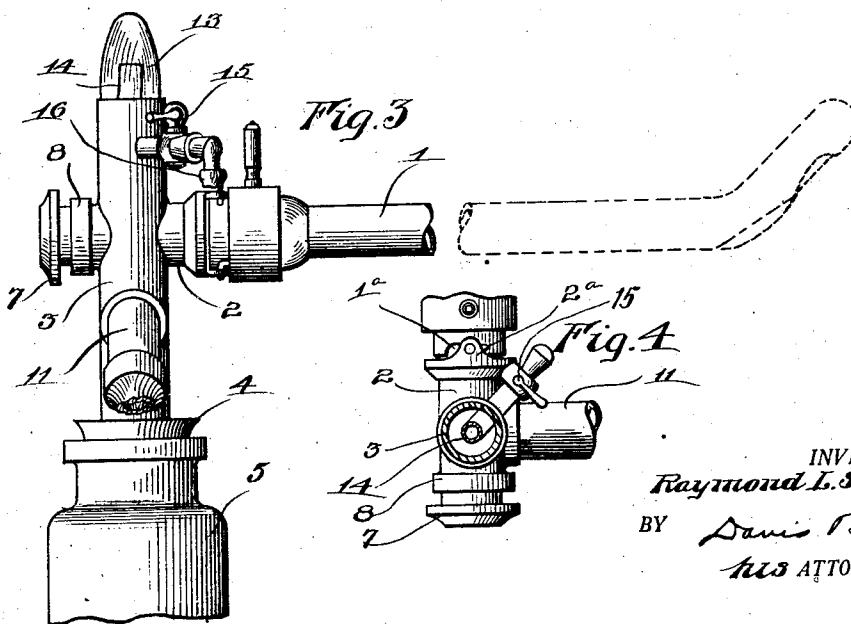
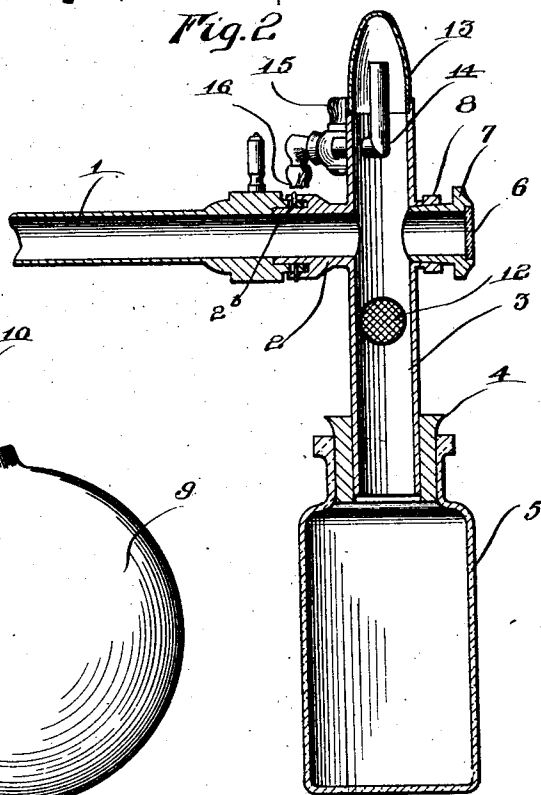
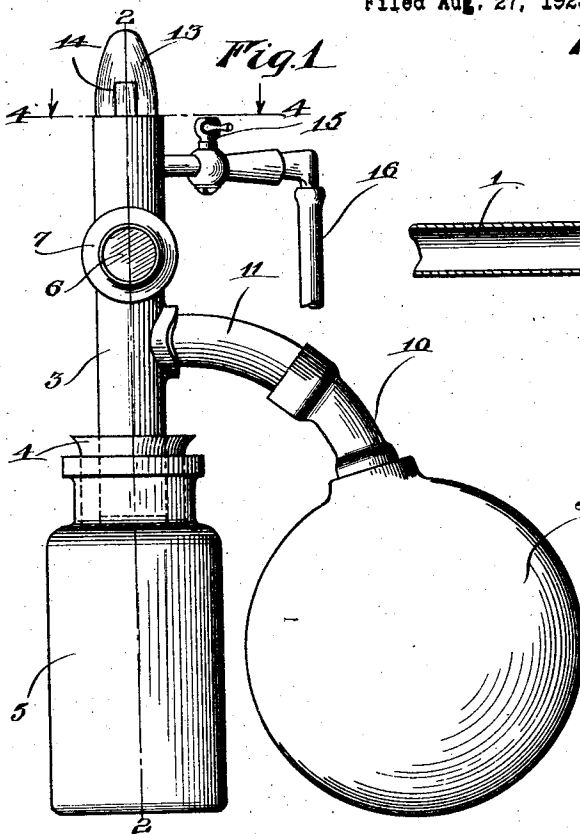


Sept. 27, 1927.

1,643,631

R. L. SCHULZ  
SURGICAL INSTRUMENT

Filed Aug. 27, 1923



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## UNITED STATES PATENT OFFICE.

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## SURGICAL INSTRUMENT.

Application filed August 27, 1923. Serial No. 659,463.

The present invention relates to surgical instruments and more particularly to the type designed for permitting the operator to treat various internal cavities of the body, and an object of the invention is to provide an instrument through which the flushing of a cavity such as the bladder may be effected under the vision of the operator free from interference of air bubbles.

To these and other ends, the invention consists of certain parts and combinations of parts, all of which will be hereinafter described: the novel features being pointed out in the appended claims.

In the drawings:—

Fig. 1 is a view of the instrument in elevation;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a fragmentary view in elevation at right angles to that illustrated in Fig. 1; and

Fig. 4 is a section on the line 4—4, Fig. 1.

One of the difficulties in removing stones from the urinary bladder with the ordinary lithotrite is that the process is not under sufficient visual control and it is not easy to get out all of the fragments even after they have been crushed. Residual fragments become the nuclei for further stone formation.

Lithotrites which embody a cystoscopic telescope are now available. Some of these instruments are of so large a calibre as to have a limited field for use. For crushing stones, the Bigelow lithotrite is still a very good instrument and can be found in many hospitals. Most of the evacuators heretofore in use are more or less cumbersome. The work has to be done blindly and considerable irrigation is sometimes necessary in order to remove all fragments. Apparently no one method is applicable to all cases. The device here presented is intended to simplify the complete removal of all fragments of stone after litholapaxy.

In the illustrated embodiment of the invention there is employed an electrically lighted cystoscope or other tube 1 of any suitable construction which is fitted upon a lateral extension 2 of the upright tube 3. In order to hold it to this connection the lateral extension 2 has a pair of ears 2<sup>a</sup> diametrically arranged and provided with inwardly extending pins or projections 2<sup>b</sup>. The tube 1 has in opposite sides diametrically ar-

ranged bayonet slots 1<sup>a</sup> in which the projections or pins 2<sup>a</sup> are adapted to enter in order to hold the cystoscope or tube 1 firmly to the extension 2. The lower end of the upright tube 3 is surrounded by a stopper 4 of rubber or other yielding material fitted in a transparent bottle or container 5 and opening to said container. Supported by the upright 3 in line with the cystoscope tube 1 is a view opening or window 6 in the form of a lens fitted in the end of a hollow plug 7 having a tight slip engagement with a lateral extension 8 formed on the upright 3 opposite the lateral extension 2 so that the user of the instrument may look directly into the cystoscope or tube 1 through the upright chamber or tube 3.

Also connected to the upright chamber or tube 3 is an evacuating bulb 9 which through a flexible tube 10 connects with a curved lateral extension 11 secured to the upright 3 below the view opening 6; a wire screen 12 being positioned at the inner end of the tube 11 flush with the inner wall of the chamber 3. At the top of the upright chamber or tube 3, a dome 13 is provided preferably in the form of a transparent dome shaped member rigidly secured to the upper end of the upright member 3 above the view opening and the cystoscope or tube connection. Leading through the upper end of the chamber above the cystoscope connection is a vent tube 14 which extends preferably upwardly into the dome 13. A turning plug or valve 15 is provided in the vent tube and from the vent tube a flexible tube 16 may lead to any suitable point to conduct any water passing from the dome at the time the latter is vented.

The bladder stones are crushed in the usual way with a lithotrite. The cystoscopic tube is then inserted into the bladder and the major portion of debris washed out a few times by simple irrigation. When the return fluid is clear enough, the suction apparatus is attached to the cystoscope. But before this is done, the bladder is filled with water by means of an irrigating apparatus connected to the cystoscope tube. The bulb, bottle and upright chamber and all parts of the instrument are filled with water, the air being allowed to escape from the dome by means of the valve 15. During the filling with water, the bulb is gently compressed

several times so as to expel all of the air. The instrument is then connected to the cystoscope tube, care being taken that the patient's bladder is not over distended. The electric light is then turned on and one gets a clear view of the inside of the bladder through the observation window. Fragments of calculi are readily located. The suction bulb is gently and completely compressed while the other hand manipulates the cystoscope in search of fragments and brings the beak into proximity with them. Then the compression is slowly released, thus producing a strong current of water which carries with it the fragments seen and deposits them in the bottle. The entire process is visible throughout, the stones can be seen rushing up into the cystoscope and if a fragment does not pass readily, it may sometimes be coaxed up by alternate compression and suction or manipulation of the beak of the cystoscope. If any air bubbles are present in the range of vision, these may be eliminated by opening the vent valve 15.

Such fragments as are too large to pass through the cystoscope must be either crushed still smaller or broken by means of a long snare which may be used in the same cystoscope through a special window. After the fragment has been broken small enough, it may be evacuated immediately through the same tube.

Prior to this invention a suction bulb or evacuating member with a bottle or container has been used in connection with a plain tube or cystoscope for evacuating bodies from the urinary bladder, but this work has never been under visual control. If a direct view cystoscope were used it was merely for the purpose of inspection and a separate operation was required for the evacuation. In this invention, the evacuation takes place during the inspection and in addition it is possible to keep the field of vision free from air bubbles.

By means of this cystoscopic evacuator it is possible to clean out all fragments of stone more quickly and leave the bladder in a less traumatized condition than if stronger evacuators are used which are not under visual control. This method can be used without a general anaesthetic if the patient's

bladder is not too sensitive. The use of the lithotrite is apt to be the more painful part of the procedure, but even this need not be unduly severe if one is a little bit considerate.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A surgical instrument comprising a tube for insertion into a body cavity, means for permitting the inspection of the cavity through said tube, a collecting receptacle having an air tight connection with the tube at one side thereof, a chamber for collecting air bubbles, projecting from one side of the tube opposite the connection of the latter with the collecting receptacle, a bulb for creating a suction in the tube for drawing the foreign matters into the collecting receptacle, and means for venting the air bubble collecting chamber.

2. A surgical instrument comprising a tube for insertion into a body cavity, means for permitting the inspection of the body cavity through the tube, a collecting receptacle having an air tight connection with one side of the tube, a transparent dome connecting with the tube to provide a chamber in which air bubbles may collect, means for venting such chamber, and a bulb for creating a suction in the tube.

3. A surgical instrument comprising an upright chamber, a tube connecting with said chamber for insertion into a body cavity, a viewing device in the chamber opposite said tube, a collection receptacle connected with said chamber below said tube for drawing the foreign matters through the tube into the collection receptacle and an air dome formed at the top of the chamber above the tube.

4. A surgical instrument comprising an upright chamber, a tube connecting with said chamber for insertion into a body cavity, a viewing device in the chamber opposite said tube, a collection receptacle connected with said chamber below said tube for drawing the foreign matters through the tube into the collection receptacle and an air dome formed at the top of the chamber above the tube, said air dome being provided with an air vent.

RAYMOND L. SCHULZ.