

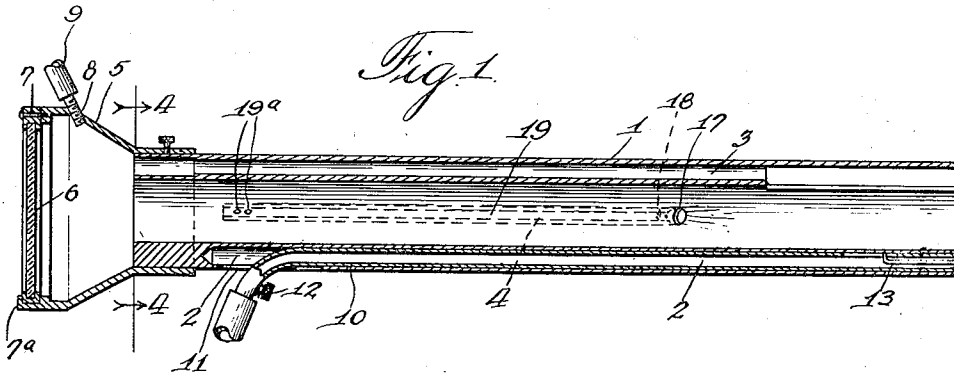
May 27, 1941.

C. E. POPE

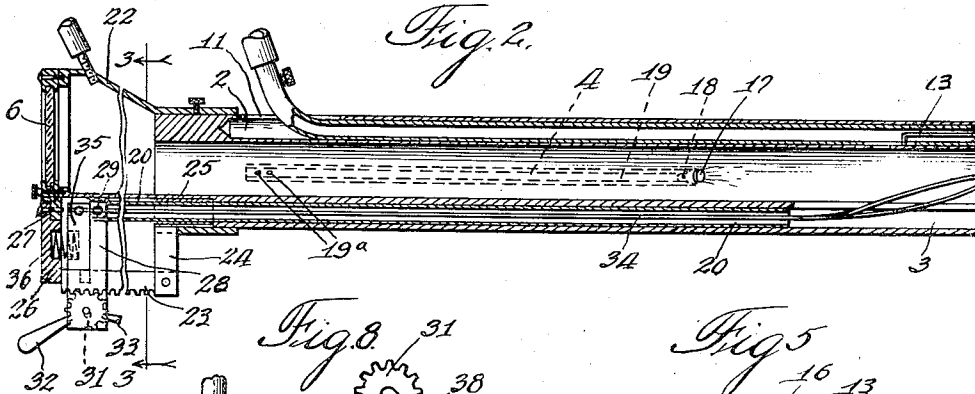
2,243,285

OPERATING SCOPE

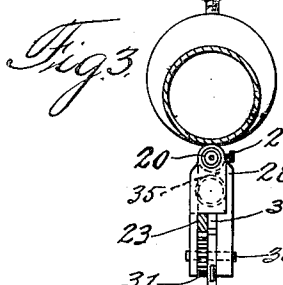
Filed Jan. 6, 1936



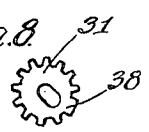
*Fig. 1.*



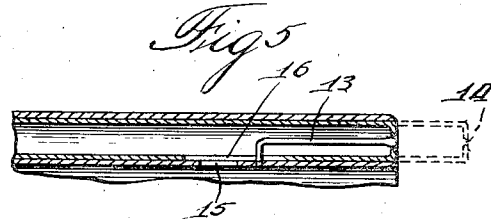
*Fig. 2.*



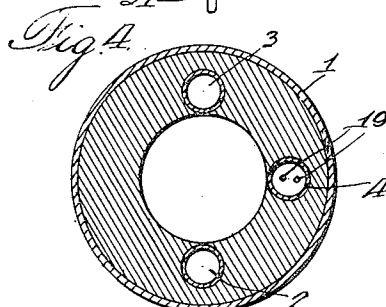
*Fig. 3.*



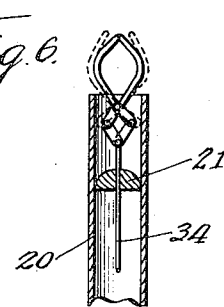
*Fig. 8.*



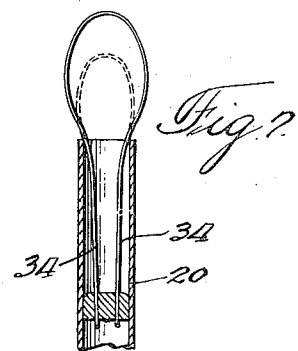
*Fig. 5.*



*Fig. 4.*



*Fig. 6.*



*Fig. 7.*

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# UNITED STATES PATENT OFFICE

2,243,285

## OPERATING SCOPE

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Application January 6, 1936, Serial No. 57,714

8 Claims. (Cl. 128—6)

This invention relates to scopes of various types and has special reference to sigmoidoscopes or proctoscopes. More particularly, the present invention relates to a scope having provision for the positioning of various instruments therein in such a manner that the field of vision within the scope is substantially unobstructed and the instruments may be manipulated while gas pressure is maintained in the tube.

The scope may comprise a barrel having walls of substantial thickness, which is open at one end and is provided at the other with a transparent closure member or cap which is preferably removable. The walls of the barrel may be provided with canals in which the various instruments may be positioned and means is provided for supplying pressure to the barrel, the latter being so constructed that the pressure may be maintained therein at all times.

When a scope such as a sigmoidoscope or proctoscope has been inserted into a patient, gas under pressure is supplied thereto, which will hold the organs and tissues adjacent the open end of the barrel away therefrom so that examination or surgical excision may be performed without interference from bowel peristalsis or body movements such as may result from a change in intra-abdominal pressure or may be caused by respiration.

The scope is adapted to receive instruments therein, such as electrodes, wire snares, tissue punches, and others. In addition, an aspirator and a light source are preferably provided within the walls of the barrel. Means are provided for operating the various instruments from outside the barrel. With such a device the barrel may be easily inserted and the entire examination or operation carried on with substantially unobstructed vision while gas pressure is maintained in the barrel.

Further advantages and objects will be apparent from the following description when considered with the accompanying drawing, in which latter:

Figure 1 is a cross-sectional view of a scope with a cap thereon which may be used for ordinary examination work;

Fig. 2 is a cross-sectional view of a scope with an instrument positioned therein and a modified type of cap employed thereon;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is an enlarged cross-sectional view showing the end of an aspirator in a canal;

Fig. 6 is a partial cross-sectional view of a tissue punch adapted for use in connection with the scope;

Fig. 7 is a partial cross-sectional view of a snare which may also be used with the scope; and

Fig. 8 is an elevational view of a ratchet wheel which may be employed with the scope.

Referring more particularly to the drawing, there is shown a tube or barrel 1 of substantial thickness, the thickness preferably being such that longitudinal canals 2, 3 and 4 may be formed therein. The barrel is preferably made of a molded condensation product, although other materials such as non-corrosive metal may be employed. On one end of the barrel which will be hereinafter referred to as the normally closed or closed end is a cap or end piece 5. The cap may be frictionally positioned on the end of the barrel or removably secured thereto by any desirable means and is provided with a transparent closure 6. The closure 6 is arranged so that it may be moved and thereby open that end of the barrel. For this purpose the closure member 6 may be pivoted as at 7 and when in closed position is held tightly against the cap 5 by a spring or frictional contact 7a. The cap 5 also may be provided with an opening 8 for the reception of one end of a gas pressure line shown at 9, which may be either threaded into the cap 5 or secured therein merely by frictional engagement. The opposite end of the barrel which is to be inserted into a patient will be referred to as the open end thereof.

An aspirating tube 10 may be positioned in the canal 2, with one end projecting from the barrel 1 through a slot 11. This is used for removing liquids, smoke or other gases or tissue from the field of operation. The end of the tube projecting through slot 11 may be connected to any suitable vacuum means or vented to the air and any suitable valve 12 may be provided for controlling the operation of the aspirator. The aspirator tube 10 is slidably positioned in the recess 2 so that the free end thereof may be projected beyond the open end of the scope, as shown in dotted lines in Fig. 5. This end of the aspirator tube has a restricted inlet which is ordinarily sufficient for withdrawing the desired substance. However, this may become clogged, and means are provided for cleaning out the end thereof and also permitting the aspirating to continue while this is being done.

For this purpose an angled wire or other clean-

ing member 13 is mounted on the inner wall of the scope and extends into the aspirator tube. The free end of the cleaning member 13 lies substantially within the opening 14 in the open end of the aspirator tube when this barrel is in its retracted position. When in use, the aspirator tube is moved to the position shown in dotted lines in Fig. 5 and the material may be drawn through the opening 14 past the cleaning member 13. When the aspirator tube is retracted, the end thereof will pass over the end of the cleaning member 13, which thereby removes any material from the opening 14.

In order to enable aspiration to be carried on while any foreign substance is being removed from the end of the aspirator tube, a slot 15 is provided in the wall of the canal 2 which may register with a slot 16 in the aspirator tube. These slots coincide when the aspirator tube has been moved into the barrel 1, such as is shown in Fig. 5, and the end of the tube is closed, or substantially so, by the cleaning member 13. However, when this tube is moved so as to project beyond the outer end of the barrel 1 there will be no further registration of these slots. The slots, as shown in Fig. 5, are preferably so arranged that such aspirating may be done there-through in conjunction with that carried on at the adjacent end of the aspirator tube, if desired.

A bulb or other light source 17 is preferably mounted in a canal 4 in the barrel 1 intermediate the ends thereof but preferably closer to the closed than to the open end. The bulb is preferably held by a socket 18, and wires 19 in the canal 4 connect the socket with electrical contacts 19a mounted in the barrel to permit current to be supplied to said light source. As the bulb lies substantially within the wall of the barrel 1, it will not interfere with the field of vision at the open end of the barrel.

The canal 3, which may extend throughout the length of the barrel 1, is intended for the reception of the various instruments hereinbefore mentioned, with any others which may be suitably employed. A tube having an electrode therein is shown in Fig. 2 as being positioned within the canal 3 so that the operating end of the electrode 20 extends beyond the open end of the barrel 1. The tubes of the various instruments are of such a size that they will snugly fit within the canal 3, and when provided with a seal 21 or other suitable sealing means will prevent the escape of any gas from the scope. When an instrument is to be employed, the cap 5, which is designed for examination work, is removed and an operating cap 22 inserted in place thereof. The cap 22 is so designed that when inserted in place it will not interfere with the adjacent end of the instrument tube 20, which therefore may be manipulated as hereinafter described.

When the scope with an instrument therein has been inserted preparatory to operating, it is desirable to provide means whereby the instrument may be moved both longitudinally and laterally as well as being rotated so that the electrode, snare or punch may be properly positioned for the desired work. For this purpose a rack 23 is pivotally mounted adjacent the normally closed end of the barrel. At one end of the rack there is provided a support 24 which extends through a slot in the canal 3 and is connected to a hinge member 25 which, in turn, lies in an enlarged portion at the adjacent end of the canal 3, so that the inner dimensions of the

hinge 25 are the same as the inner dimensions of the rest of the canal 3. With this arrangement the support 24 pivots about the instrument tube. An additional support 26, secured to the other end of the rack, is pivoted at 27 to a portion associated with the cap 22. A positioning member 28 is provided at its upper end with an aperture through which the tube 20 of the instrument to be used is inserted and secured thereto by a thumb screw or other suitable means 29. The lower end of the positioning member 28 may be forked to pass on each side of the rack 23. It is provided with a shaft 30 upon which is fixedly mounted a rack wheel 31 for engagement with the ratchet 23. Extending from the shaft 30 is a handle 32 and a projecting member 33. With this construction, when the handle 32 is rotated the positioning member carries the instrument tube 20 therewith toward the open end of the barrel. By controlling the rotation of the ratchet wheel 31, the distance which the instrument is moved longitudinally is likewise controlled.

The instruments commonly employed with such a scope are generally operated by means of wires 34 which pass through the instrument tube. Movement of either the barrel or the wires relative to the other actuates the instrument, which, if a snare, tightens the loop at the end or, if a punch, brings the two claws of the punch together. It is therefore necessary, in order to operate instruments such as those above mentioned, that means be provided for causing relative movement between the instrument tube 20 and the wires 34. For this purpose a block 35 is resiliently held against the positioning member 28 by a coil spring or other suitable means 36. The instrument wire 34 may be secured to the block 35 by a thumb screw or other suitable means. Thus, the block 35 moves with the driving member 28 until the stop member 33 comes in contact with a lug or other projecting member 37 carried on the lower end of the block 35. Further rotation of the ratchet wheel 31 continues to move the positioning member 28 and the instrument tube 20, but the block 35 connected to the wire 34 is held stationary or is moved rearwardly, thus causing relative movement between the wire 34 and the tube 20 to operate the instrument.

It may be desirable in certain cases to move the instrument toward the closed end of the barrel without releasing the punch or the snare. To accomplish this, the ratchet wheel 31 may be provided with an enlarged tooth 38 which, when the ratchet wheel has reached the end of the rack 23, engages the ratchet and tends to move the ratchet wheel downwardly out of engagement with the rack. A slot may be provided in the ratchet wheel 31 which permits this movement. Thereafter, the ratchet wheel, positioning member 28 and block 35 may be moved away from the support 24 without changing their relative positions.

While a particular construction is shown and described for moving the instrument longitudinally and rotationally and for operating the instrument, it is to be understood that any other suitable mechanism may be employed which accomplishes the same result.

Through the use of the instrument hereinabove described, the scope may be used while gas pressure is maintained therein at all times, and the instruments employed therewith may be operated from without the scope without affecting the pressure in the barrel and without sub-

stantially interfering with the field of vision within the barrel. Furthermore, as there are preferably no portions projecting outwardly from the barrel, the same may be easily inserted for use.

While I have shown and described certain embodiments of the invention, it is to be understood that various modifications may be made therein without departing from the spirit and scope thereof, and I wish, therefore, to be limited only by the appended claims and the prior art.

I claim:

1. A device of the character described comprising a barrel and a longitudinally extending canal in said barrel wall, an aspirator tube for connection at one end to a suction line positioned in said canal and having an aperture at the other end thereof, and means for preventing clogging of said aperture.

2. A device of the character described comprising a barrel and a longitudinally extending canal in said barrel wall, an aspirator tube for connection at one end to a suction line slidably positioned in said canal and having an aperture at the other end thereof, said aspirator tube having a slot therein adjacent the apertured end thereof, and a cleaning member connected to the wall of said canal and extending into said aspirator tube, said member being so positioned that when the aspirator tube is moved toward the apertured end of said tube the cleaning member may extend through the aperture therein and when the aspirator tube is moved in the opposite direction, the apertured end thereof will be spaced from said cleaning member.

3. A device of the character described comprising a barrel and a longitudinally extending canal in said barrel wall, an aspirator tube for connection at one end to a suction line slidably positioned in said canal and having an aperture at the other end thereof, said aspirator tube having a slot adjacent the apertured end thereof, the walls of said canal being provided with a slot for registering with the slot in said aspirator tube when the latter is in certain positions, and a cleaning member connected to the wall of said canal and extending into said aspirator tube, said member being so positioned that when the aspirator tube is moved toward the apertured end of said tube the cleaning member may extend through the aperture therein and when the aspirator tube is moved in the opposite direction the apertured end thereof will be spaced from said cleaning member, said slot being in registration when said cleaning member is adjacent said aperture.

4. The combination with an instrument comprising a tube and an operating member actuated by relative movement thereof with respect to said tube, of a scope comprising a barrel having a longitudinal canal in the walls thereof for the reception of said instrument, movable means associated with said scope for imparting longitudinal movement to said instrument tube, securing means resiliently held adjacent said movable means for being connected to said operating member, and stop means for limiting the movement of said securing means whereby the movable means and the securing means may be moved until said securing means comes in contact with said stop means and further movement of said movable means causes relative

movement between said tube and said operating member.

5. The combination with an instrument comprising a tube and an operating member actuated by relative movement thereof with respect to said tube, of a scope comprising a barrel having a longitudinal canal in the walls thereof for the reception of said instrument, a movable positioning member associated with said scope for imparting longitudinal movement to said instrument tube, a block resiliently held adjacent said positioning member for being connected to said operating member, actuating mechanism for longitudinally moving said positioning member and said block, and stop means for limiting the movement of said block whereby the movable means and the block may be moved until said block comes in contact with said stop means and further movement of said movable means causes relative movement between said tube and said operating member.

6. An operating scope comprising a barrel member open at one end and having a transparent closure at the other end, means for supplying gas under pressure to said barrel, said device being provided with means for permitting the manipulation of an instrument adjacent the open end thereof with substantially no escape of gas from the closed end of said barrel, an aspirating tube and means for causing a continuous suction therein, the end of said aspirating tube being positioned adjacent the open end of said barrel for permitting the continuous withdrawal of fluid from adjacent the open end of said barrel while pressure is maintained therein.

7. An operating scope comprising a barrel member open at one end and having a transparent closure at the other end, an opening in said barrel means for supplying gas under pressure to said opening, said barrel having means for permitting the manipulation of an instrument adjacent the open end of said barrel with means for preventing the escape of gas around said instrument, an aspirating tube and means for causing a continuous suction therein, the end of said aspirating tube being positioned adjacent the open end of said barrel for permitting the continuous withdrawal of fluid from adjacent the open end of said barrel while pressure is maintained therein, said tube lying within the outer surface of said barrel adjacent the operating end thereof.

8. An operating scope comprising a barrel member open at one end and having a transparent closure at the other end, an opening in said barrel means for supplying gas under pressure to said opening, said barrel having means for permitting the manipulation of an instrument adjacent the open end of said barrel with means for preventing the escape of gas around said instrument, an aspirating tube and means for causing a continuous suction therein, the end of said aspirating tube being positioned adjacent the open end of said barrel for permitting the continuous withdrawal of fluid from adjacent the open end of said barrel while pressure is maintained therein, said tube lying within the outer surface of said barrel adjacent the operating end thereof and valve means for controlling the withdrawal of fluid through said aspirating tube.

CHARLES E. POPE.

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CERTIFICATE OF CORRECTION.

Patent No. 2,243,285.

May 27, 1941.

CHARLES E. POPE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 5, and second column, line 26, for the word "barrel" read --tube--; same page, first column, line 33, for "closed than to the open" read --open than to the closed--; same page, second column, line 14, for "rack" read --ratchet--; line 15, for "ratchet" read --rack--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of July, A. D. 1941.

(Seal)

Henry Van Arsdale,  
Acting Commissioner of Patents.