

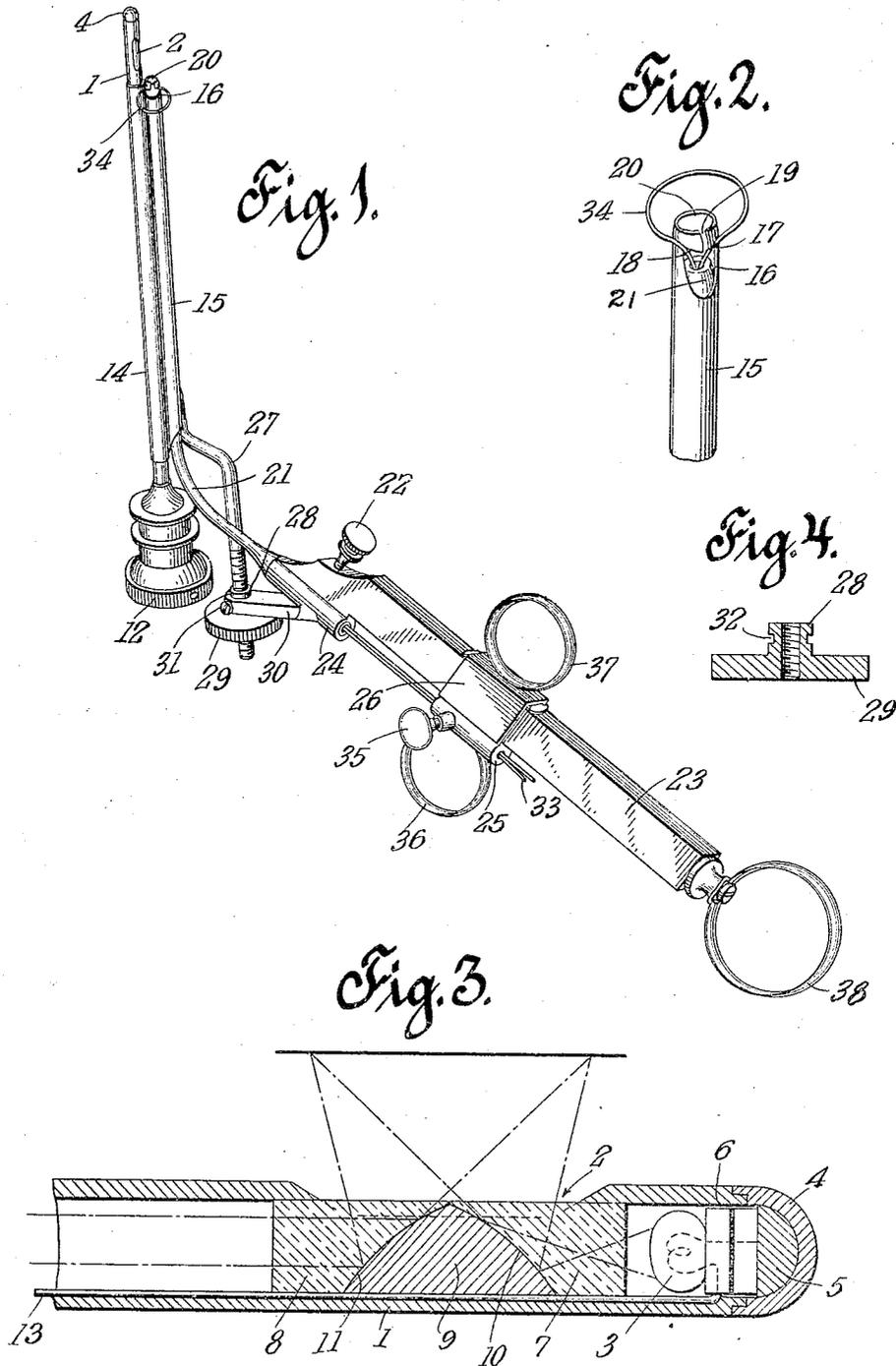
Dec. 13, 1932.

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1,891,054

SURGICAL INSTRUMENT

Filed March 28, 1931



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## SURGICAL INSTRUMENT

Application filed March 28, 1931. Serial No. 525,901.

This invention relates to a surgical instrument of the type provided with illumination and observation means, and adapted to be inserted through one of the various openings of the body to reach the points of treatment or observation.

The main object of my invention is to provide a new and improved snare for the removal of hypertrophied growths in the nasopharynx or on the posterior tips of the inferior turbinate.

A further object is to provide an instrument of this type with an efficient illumination apparatus capable of withstanding and surviving the conditions of dampness encountered in the various cavities and passages of the body.

Further objects and advantageous features of my invention will become apparent from the description, to which I now proceed, of a specific embodiment of my invention which is illustrated in the drawing.

In the drawing:

Fig. 1 is a perspective view of a snare embodying my invention.

Fig. 2 is a detail view showing the loop angulating end of the snare.

Fig. 3 is a detail view showing the arrangement of the illuminating means.

Fig. 4 is a detail showing the means for operating the angulating means.

Referring now to the drawing, the illumination and observation means are mounted in a tube or sheath 1, preferably of metal. The tube is provided with a lateral opening or window at a substantial distance from the distal end of the tube. An electric lamp bulb 3, which may be of the condensing type, is located lengthwise in the tube 1 with its base at the distal end and its filament directed along the tube towards the window. A cap 4, removably secured to the end of the tube, carries a button 5 to contact the bulb base. The lamp is held in place by frictional engagement with insulating sleeve 6.

At the opening 2, and for some distance beyond either end of the same, the tube is filled with a substantially cylindrical plug or block comprising end members 7, 8 of transparent material and an intermediate member

9 of substantially triangular cross-section. The member 9 has its apex at or near the middle of the opening 2 and is provided with diagonally extending sides 10, 11 which act as reflecting surfaces. The surfaces may be plane or curved as may be convenient.

Light from the lamp 3 passes through the transparent member and is reflected at the surface 10 to pass out of the window 2 to illuminate the object. Light from the object passes by way of the window 2 through the member 8 and is reflected by mirror surface 11 down the tube to an eye-piece (not shown) located at the proximal end 12 of the tube. It is clear that the blocks 7 and 8 may act as lenses by appropriately shaping their entrance and exit surfaces. The members 7, 8, 9 together form a unit which may be fixed in position as a whole. The member 9 is mechanically useful as a base to which the lens or prism members 7 and 8 may be fixed in accurate relation. It is clear, further, that the member 9, if desired, may be omitted, and reflection had from the inner surfaces of members 7 and 8, either by total reflection or by the aid of a film of silver, or similar metal.

Current is supplied to the lamp by means of the insulated wire 13 passing along the side of the tube through channels in the members 7, 8, 9 and connecting with the lamp by way of an opening in the insulating sleeve 6. The return is made through conducting button 5 and the metal of the tube 1. It is to be noted that the lamp is entirely surrounded by the tube 1 and is located an appreciable distance from the edge of the window 2. In former devices the lamp was located directly behind the window and protected only by a thin pane of glass. Under the action of the heat developed by the lamp, it was quite common for the pane to crack, thus providing a short and direct path between the surrounding moisture and the electrical connections which would result in a short circuit requiring expensive repairs. In my invention, even should the member 7 crack all the way through, the path is so long that the danger of a short circuit is insignificant under the ordinary conditions of use.

The snare is mounted upon the exterior of

the tube 1 by means of a sleeve 14 or similar means permitting adjustment about the axis of the former. Rigidly attached to 14 is an open-ended tube 15 having a lateral heart-shaped opening 16 near its upper end, said opening providing corner pockets 17, 18 at its upper edge. A slit 19 in tube 15 intermediate the pockets communicates the opening 16 and the open end 20 of the tube.

Inside 15 is telescoped an open-ended tube 21 which is secured at one end, as by means of set screw 22, to a handle 23 so that the lumen of tube 21 is aligned with passage 24 on handle 23 and passage 25 on member 26 which is adapted to slide on handle 23. Tube 15 is adapted to be reciprocated to some extent upon tube 21. The operating means for this purpose comprises an arm 27 rigidly secured at one end to tube 15 and having the other end screw threaded to engage and pass through a screw threaded sleeve 28 which may be turned by a milled head 29. The sleeve is mounted in an arm 30 of handle 23; and is kept from advancing by the pin 31 which passes through arm 30 and engages in the peripheral groove 32 of the sleeve.

A doubled wire 33 is run through the passages 20, 21, 24 and 25 and is formed with a loop 34 at its outer end. A set screw 35 holds the wire 33 securely to the sliding piece 26. After the loop is formed, the individual wires are passed through slit 19 and lodged in pockets 17, 18 respectively, the tube 15 being advanced relative to the tube 21. The instrument is then inserted in the passage to be operated upon; and the snare is adjusted around tube 1 to proper position. The head 29 is turned to retract tube 15 over tube 21. As a result the lip of the opening 16 bends the loop 34 over until it embraces the growth to be excised. The fingers are engaged in rings 36, 37 on slider 26; and a sharp pull actuates the loop to cut the growth. A ring 38 on the handle provides a convenient thumb rest for the operator.

It is to be noted that the loop 34 is mounted near the window 2 and may therefore be kept in the field of view. In order to permit a greater degree of angulation of the loop, the upper end of tube 21 may be bevelled to thin the edge as shown in Fig. 2. The upper edge of opening 16 and the upper edge of tube 21 acting in co-operation permit of the loop being angulated considerably more than ninety degrees. The specific mounting described permits all desirable adjustments under full illumination. For illustrative purposes the observation tube 1 has been shown as straight; but it is clear that the main features of this invention may be applied to any such observation telescope, whether straight or not, variations in detail, not departing from the spirit of my invention, will be apparent to those versed in the art.

I claim as my invention:

1. In combination, an observation tube carrying illumination means, a loop mounted on the observation tube within the field of view, means mounted on the observation tube and movable thereon to angulate the loop.

2. In combination, an observation tube carrying illumination means, means for holding a loop in the field of illumination, and means mounted on the observation tube and movable thereon for angulating the loop.

3. In combination, an observation tube carrying illumination means, a loop mounted on the observation tube in the field of illumination, means mounted on the observation tube and movable thereon to angulate the loop, and means to actuate the loop.

4. In combination, an observation tube carrying illumination means, a snare mounted on the tube and having a loop positioned in the field of illumination, means permitting adjustment of the snare on the tube, and means for angulating the loop under illumination at the locus of operation.

5. An instrument of the class described comprising means for guiding the terminal strands of a loop, means mounted on the first mentioned means for angulating the loop, and means for actuating the loop.

6. An instrument of the class described comprising means for guiding the terminal strands of a loop, and means movable relative thereto and cooperating therewith to angulate the loop.

7. In an instrument of the class described, an open-ended tube, another tube telescoped over the first tube and provided with a lateral opening.

8. In an instrument of the class described, an open-ended tube, another tube telescoped over the first tube and provided with a lateral opening in position to cooperate with an end of the first mentioned tube, and means for moving the said tubes relative to each other.

9. In combination, an open-ended tube provided with a lateral opening near one end and a slit communicating the said lateral opening and the end opening, and an open-ended tube slidably engaged inside the first tube with one end in proximity to the aforementioned lateral opening.

10. In combination an open-ended tube provided with a lateral opening shaped with corner pockets near one end and with a slit communicating the said lateral opening and the opening of the said end, an open-ended tube engaged inside the first mentioned tube with one end in proximity to the lateral opening, and means for reciprocating one tube relative to the other.

11. An instrument comprising a base, an open-ended guide for the strands of a loop, means mounted on said base and movable to cooperate with the loop end of said guide to

angulate a loop, and means slidably mounted on the base to receive and hold the terminal strands of the loop.

12. An observation tube provided with a lateral opening at a substantial distance from one end, a lamp located between the said end of the tube and the said opening and entirely enclosed by the wall of the tube, means adapted to plug the tube at the opening and to receive and reflect through the opening the light of the lamp.

13. An observation tube provided with a lateral opening at a substantial distance from one end, a source of light in the tube, means to seal the interior of the tube against the entry of moisture through the opening comprising a plug of transparent material filling the tube at the opening and means at one end of the plug adapted to receive the light and reflect it through the opening.

14. An observation tube provided with a lateral opening at a substantial distance from one end of the tube, a source of light at the said end of the tube, an optical system at the opening comprising opposed terminal members of transparent material and an intermediate mirror carrying member whereby light from the source is reflected to the exterior through the opening and light from the exterior is received through the opening and reflected to the other end of the tube.

15. An observation tube comprising a lateral opening at a substantial distance from one end of the tube, a source of light at the said end of the tube, a substantially cylindrical member acting to seal the tube at the opening and comprising opposed terminal portions of transparent material and an intermediate portion bearing oppositely disposed mirror surfaces whereby light from the source is reflected to the exterior through the opening and light from the exterior is received through the opening and reflected to the other end of the tube.

16. An optical system for a surgical observation telescope comprising opposed lens members and an intermediate member carrying oppositely disposed mirror surfaces.

17. In an instrument of the class described, an open-ended tube provided with a lateral opening shaped with corner pockets near one end and with a slit communicating the said lateral opening and the said end.

18. An observation tube provided with a lateral opening at one end, a lamp located between the said end and the opening, and means filling the tube along the entire length of the opening and provided with means to direct light from the lamp through the opening to the exterior and to receive light through the opening from the exterior and direct the same towards the other end of the tube.

19. An observation tube provided with a lateral opening at a substantial distance from

one end of the tube, a source of light at the said end of the tube and completely enclosed therein, an optical system fixed at the opening comprising opposed members of transparent material and oppositely disposed reflecting surfaces between the said members whereby light from the lamp is reflected through the opening to the exterior and light from the exterior is received through the opening and reflected towards the other end of the tube.

20. An observation tube provided with a lateral opening at a substantial distance from one end of the tube, a source of light at the said end and completely enclosed therein, and a member fixed in the tube at the opening and provided with oppositely inclined reflecting surfaces whereby light from the source is reflected through the opening to the exterior and light from the exterior is received through the opening and reflected towards the other end of the tube.

21. An observation tube provided with a lateral opening at a substantial distance from one end of the tube, a source of light at the said end of the tube, a substantially cylindrical member acting to seal the tube at the opening and comprising opposed portions of transparent material and mirror surfaces oppositely disposed intermediate the said portions whereby light from the source is reflected to the exterior through the opening and light from the exterior is received through the opening and reflected towards the other end of the tube.

22. An optical system for a surgical observation telescope comprising opposed transparent members and mirror surfaces oppositely disposed intermediate said members.

23. An optical system for a surgical observation telescope comprising opposed lens members relatively fixed in position and oppositely inclined reflecting surfaces provided at the adjacent ends of the said members.

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