

Feb. 26, 1929.

1,703,216

R. H. WAPPLER

BLUNTED ENDOSCOPE

Filed Aug. 25, 1927

Fig. 1

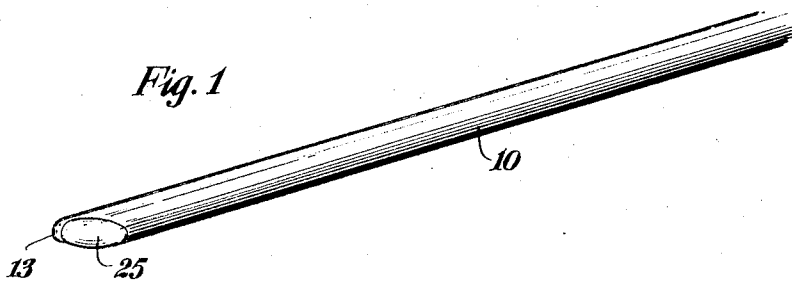


Fig. 2

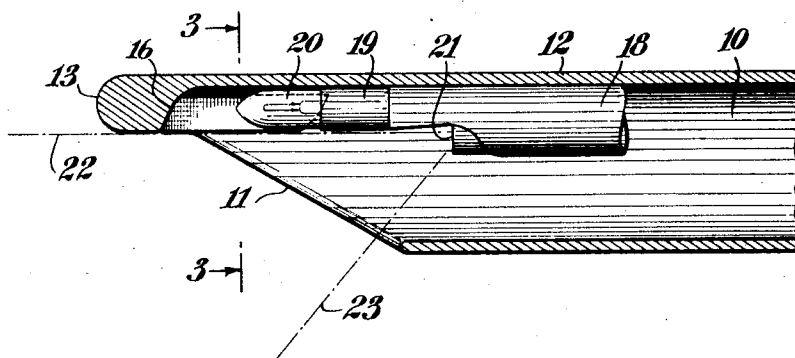


Fig. 3

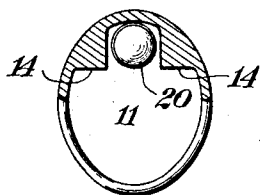


Fig. 4

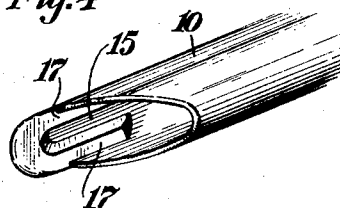
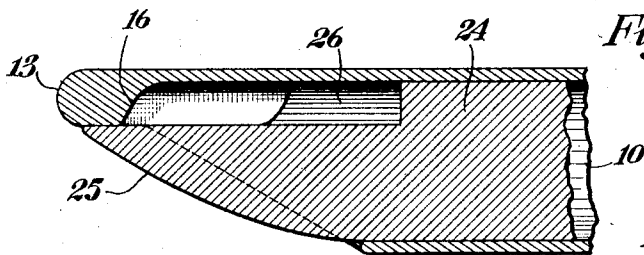


Fig. 5



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UNITED STATES PATENT OFFICE.

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BLUNTED ENDOSCOPE.

Application filed August 25, 1927. Serial No. 215,316.

My present invention relates generally to surgical instruments, and has particular reference to pan-endoscopes.

In the employment of straight or unbent endoscopic tubes having diagonally arranged fenestra at their forward ends, the insertion and removal of such tubes into and out of body cavities, and also the movement of the tubes while they are in the cavities, is quite unsatisfactory by virtue of the great possibility of injury to the walls of the cavities. The obliquely arranged fenestrum presents edges similar to those of an apple corer, and cutting of the tissues within a cavity is not only possible but quite frequent. Where the apple corer edge has been sought to be remedied by bending the edge outwardly to form a bead or the like, a corresponding disadvantage arises because of the fact that the external cross-section of the endoscopic tube has thereby been enlarged. On the other hand, where the apple corer edge is flanged inwardly, the efficiency of light transmission through the tube is thereby reduced because of the reduction in size of the entrance pupil.

Accordingly, endoscopic tubes of this character have been in general disfavor, and wherever possible, other types of tubes have been employed, as for example, those with closed beaks and side fenestra, or with front openings arranged along a transverse plane. As a matter of fact, the difficulty encountered heretofore in employing straight and unbendable surgical instruments through an endoscopic tube and under direct illuminated vision has rendered the demand for obliquely fenestrated endoscopes small.

The advent of my improved telescope, however, wherein a lamp and telescopic tube have been provided and concentrated in a single tube of ordinary dimensions—and more fully described in my co-pending patent applications No. 647,439 and No. 142,286—has rendered such directly visible and illuminated operations far more feasible. And inasmuch as the telescopic device referred to achieves its advantageous function by an obliquely forward field of vision, the employment of obliquely fenestrated endoscopes is highly desirable.

It is one object of my invention to provide an endoscopic tube of this character, the tube being so constructed and arranged as

to be effectually blunted. More particularly, it is accordingly an object of my invention to provide an endoscopic tube having an obliquely cut front opening so constructed that free movement of the tube, including insertion thereof, may be freely effected without any danger of injury.

It is another object of my invention to provide a tube having these desirable characteristics and being particularly adapted for employment with one of my improved illuminating telescope devices.

Another object is to provide an endoscopic device which includes a blunted tube of the character mentioned in compact and efficient cooperative combination with a forward-vision telescope.

A still further object of my invention is to provide such an endoscopic tube in combination with an obturator which is so arranged and constructed as to cooperate and complement the tube in a most efficient manner.

Briefly, it is a feature of my invention to provide an inwardly thickened and rounded end upon the longest wall portion of the endoscopic tube; and to construct this thickened portion in such a manner that the desirable features hereinbefore referred to may all be effected in a simple and inexpensive manner.

For the attainment of the foregoing objects and such other objects as may hereinafter appear or be pointed out, I have illustrated one embodiment of my invention in the accompanying drawings in which—

Fig. 1 is a perspective view of the forward end of an endoscopic tube embodying the features of my invention and shown in combination with an obturator of particular construction;

Fig. 2 is a longitudinal cross-section through the forward end of the endoscope, showing also the forward end of a suitably designed telescope device associated therewith;

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

Fig. 4 is an enlarged perspective view of the forward end of the tube; and

Fig. 5 is a view similar to Fig. 2 showing the tube associated with the obturator.

Referring to Figures 2 and 4, 10 denotes an unbent endoscopic tube provided with a front fenestrum 11, the latter being arranged to lie along a plane forming an angle

with the tube axis. This oblique arrangement of the front opening renders the wall portion 12 longer than the other wall portions of the tube. I have found that the injurious effects of the ordinary apple corer edge are due primarily to the front edge of this longest wall portion. When this front edge secures a bite upon a cavity tissue, the apple corer edge becomes operative and dangerous. If this front edge can be prevented from securing a bite, the balance of the apple corer edge is considerably less likely to cause injury by itself. Accordingly, I have thickened the wall portion 12 at its forward end.

This thickening is clearly illustrated in Figure 2, and it will be noted that the outer surface of the tube has been retained straight until it comes substantially up to the plane of the fenestrum 11. At this point, it is caused to round inwardly along the surface 13, thereby producing a rounded and inwardly thickened front end. The inner surface 14 of the thickened portion does not conform to the curvature of the tube, however, but extends rearwardly along a longitudinal plane.

Upon reference to Figure 4, it will be seen that the thickened portion is provided with a medial longitudinal groove 15. The base of the groove 15 is a continuation of the inner surface of the wall portion 12, and the groove extends from the rearmost end of the thickened portion to a point 16 short of the rounded outer surface 13. As a result of the provision of this groove, the thickened portion assumes a U-shape wherein the curved portion of the U is forwardly disposed and constitutes a blunted forward end of the tube as a whole. The arms 17 of the U extend rearwardly for a short distance into the tube, as shown in Figure 4, and the arms are so spaced that the groove 15 will snugly accommodate the tip of a lamp tube designed to be arranged along the inside surface of the wall portion 12.

In Figures 2 and 3 I have illustrated the forward portion 18 of an illuminating telescope device of the character described in my said co-pending applications and for the employment of which the present endoscopic tube is particularly adapted. Without describing the device 18 in great detail, I will point out that a lamp-accommodating socket or extension 19 extends forwardly from the body of the tube 18 and lies wholly within the calibre of the latter. A lamp 20 is accommodated or mounted in the extension 19. The lamp and the lamp extension being of smaller cross-section than that of the tube 18, a particularly constructed objective arranged behind the lamp and its socket is adapted to have a portion 21 thereof outwardly exposed. An objective system of the device 18 is so constructed and arranged as

to command a forwardly oblique field of vision which skirts the lamp extension 19 and the lamp 20 and which is approximately bounded by the inner and outer limits 22 and 23 respectively.

Reference to Figure 2 will indicate clearly that an obliquely fenestrated endoscopic tube is peculiarly adapted for advantageous employment with a telescopic device having a forwardly oblique field of vision. It will be noted also that the field of vision is effectually illuminated from the side by the lamp 20, and in this way direct forward illuminated visibility is rendered possible by the employment of just a single tubular element 18 of no larger cross-section than that of the usual lamp-carrying or telescopic tubes.

The present endoscopic tube is so designed that the extension 19 and the lamp 20 will be snugly accommodated in the groove 15, thus lending firm support to the telescopic device, assuring its constant proper positioning, without impeding any of the relatively large clear space adapted to permit the passage of operating instruments. Not only may the tube be inserted under direct illuminated vision, where such visible insertion is desired, but the movement of the tube, either during the insertion or after the device is in the cavity, will be absolutely free from any danger of injury to the cavity walls.

In Figures 1 and 5 I have illustrated the tube in association with a specially constructed obturator. The latter has a head 24 with a forward curved surface 25 and a recess 26. The recess 26 permits the insertion of the obturator to the full extent shown in Figures 1 and 5, despite the arrangement of the thickened portion at the forward end of the endoscope. And the curved surface 25 has a contour which complements the exposed curved surface 13 of the thickened portion so that the device as a whole presents a smoothly rounded and freely insertable front end.

It will therefore be seen that I have provided an endoscopic device whose external cross-section has been preserved throughout, whose forward end is provided with an obliquely arranged opening, and which is so constructed that the tube is at the same time effectually blunted. Furthermore, it will be noted that the blunting has been effected in a manner which renders the device particularly applicable in connection with the employment of a lamp tube or illuminating telescope device. And withal, it will be noted that the construction is an extremely simple one, rendering the manufacture inexpensive.

It will be obvious that many changes in the details herein described and illustrated for the purpose of explaining the nature of my invention may be made by those skilled in the art without departing from the spirit

and scope of the invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative and not in a limiting sense.

5 Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. An endoscopic device comprising in combination a telescope having a lamp at its forward end and an objective behind the lamp so constructed and arranged as to command an obliquely forward field of vision which skirts the lamp; and an endoscopic tube having a forward fenestrum arranged along a plane oblique to the tube axis, the forward end of the longest wall portion of the tube being rounded and inwardly thickened so as to blunt said tube, and said thickened end having a longitudinal groove adapted to accommodate said lamp when the telescope is arranged along the inside of said longest wall, whereby the endoscopic tube may be safely moved about within a body cavity, and whereby said movement may be effected under direct illuminated vision through said fenestrum.

2. An endoscopic tube of rigid unyielding material and having an open forward end which defines a fenestrum traversing the tube axis and lying in a plane oblique to the tube axis, the longest wall portion of the tube having a rounded and inwardly thickened forward end, whereby the tube is effectually blunted for safe insertion and removal thereof into and from a body cavity.

3. An endoscopic tube having an open forward end oblique to the tube axis, the longest wall portion of the tube having a rounded and inwardly thickened forward end, whereby the tube is effectually blunted for safe insertion and removal thereof into and from a body cavity, said thickened portion having a longitudinal groove adapted

to accommodate the tip of an auxiliary tube arranged within the endoscopic tube and alongside of said longest wall.

4. An endoscopic tube having an open forward end oblique to the tube axis, the longest wall portion of the tube having a rounded and inwardly thickened forward end, whereby the tube is effectually blunted for safe insertion and removal thereof into and from a body cavity, said thickened portion being substantially U-shaped with the base of the U defining the blunt end of the tube, whereby a lamp tube may be arranged within the endoscopic tube and alongside of said longest wall with its tip accommodated between the arms of the U.

5. An endoscopic tube of rigid unyielding material and having an open forward end which defines a fenestrum traversing the tube axis and lying in a plane oblique to the tube axis, the longest wall portion of the tube having a rounded and inwardly thickened forward end, whereby the tube is effectually blunted for safe insertion and removal thereof into and from a body cavity, said thickened portion extending beyond the oblique plane of the open end and being so shaped and arranged that the external cross-section of the endoscopic tube is preserved throughout its length.

6. An endoscopic tube having a forward fenestrum which crosses the tube axis and is arranged along a plane oblique to the tube axis, the foremost edge portion of said fenestrum being provided with a U-shaped thickening portion extending rearwardly for a slight distance into the tube, the rounded portion of the U being forwardly disposed and extending slightly beyond said oblique plane of the fenestrum.

In witness whereof I have signed this specification this 24 day of August, 1927.

REINHOLD H. WAPPLER.