

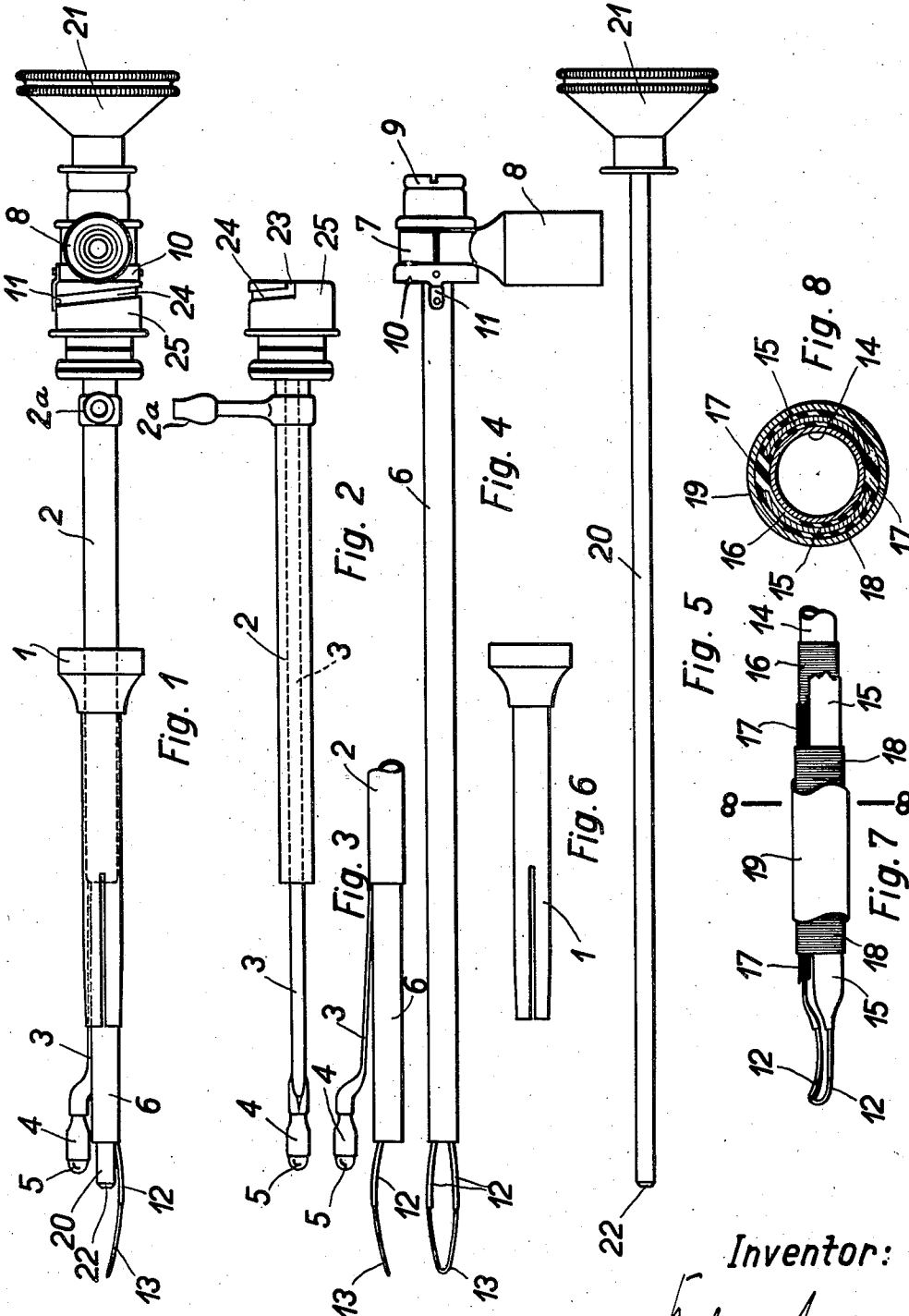
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THORACOSCOPE

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THORACOSCOPE

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The present invention concerns thoroscopes provided with an electrically heated cauter for separating adhesions from the lungs and which have a lamp for illuminating the part to be operated upon, this lamp being elastically fixed to a holding tube through which the optical tube for viewing the said part is introduced into the patient's body.

According to the invention, the cauter is disposed on a hollow catheter which can be inserted into the said holding tube, and the interior diameter of the catheter and the exterior diameter of the optical tube are such as to permit the optical tube to be inserted into the catheter, so that the operating surgeon is enabled to view the place to be burned through the thoracoscope effecting the burning. The burning process by means of the said thoracoscope need not, accordingly, be viewed through another thoracoscope, and the patient's body does therefore not need being punctured more than once.

Making such thoroscopes has been exceedingly difficult technically because the cauter is to be fed either with caustic or diathermanous current, according to whether adhesions have to be separated or a consequent hemorrhage is to be prevented by coagulation of the tissue of the part operated upon. As the electric leads are to have, accordingly, comparatively great diameters and must be insulated carefully, these leads require comparatively much space in the catheter. It has been found out, however, that the optical tube and the catheter holding the cauter can be introduced, according to the invention, at the same time into an instrument in which the lamp is fixed to the holding tube, so that the optical tube can be comparatively thin. The insertion of the lamp through the trocar sleeve is effected in the instruments constructed according to the invention before that of the catheter holding the cauter, the lamp, which is attached elastically, being pressed aside by the catheter. When using an instrument of this kind, the operating surgeon can therefore view already when the catheter is being inserted, a step which can be effected together with the insertion of the optical tube, how far and to what place in the patient's body he introduces the cauter.

To overcome the said difficulties in the supply of current by means of the catheter carrying the cauter, the current supply strips are suitably embedded between two, preferably silken, layers and these layers are placed between an interior

and an exterior tube constituting together with these layers the tube of the catheter.

At the end to be introduced, the current supply strips are conveniently made to assume the form of tubular sleeves, without the diameters of these strips being reduced, and into these sleeves are inserted the ends of the cauter, which is a wire.

If the cauter is in the form of a loop, as is the case generally, it is advisable to provide that the light entrance aperture of the optical tube be coaxial with this tube and to curve the cauter in such a manner that the vertex of the loop lies in the catheter axis, which coincides with the axis of the optical tube.

To enable the insertion of the catheter into the tube holding the lamp being so effected that both these parts assume definite positions with respect to each other, and to provide that the cauter can be given its most favorable position, it is convenient to have a bayonet groove in this tube engage a tongue fast with the head of the catheter.

The accompanying drawing illustrates a constructional example of the invention. In this drawing,

Figure 1 is a lateral view of the entire thoracoscope,

Figure 2, a lateral view of the tube holding the lamp,

Figure 3, a lateral view of the front part of the tube holding the lamp, the catheter for the cauter being inserted,

Figure 4 is a lateral view of the catheter and the cauter,

Figure 5, a view of the optical tube, and

Figure 6, a view of the trocar sleeve.

Figure 7 is a part-sectional view of the catheter tube, on an enlarged scale, and

Figure 8 shows a section through line 8—8 in Figure 7, the scale of Figure 8 being enlarged with respect to that of Figure 7.

In these figures, 1 is a trocar sleeve the front end of which is slotted. This sleeve has such an interior diameter that a tube 2 holding a lamp 5 can be inserted. In the tube 2 is a rod 3 which is suitably soldered to this tube. The rod 3 protrudes from the front end of the tube 2; this protruding part of the rod 3 being elastic. The rod 3 is hollow and contains an insulated lead supplying current to the lamp 5, which is disposed in a lamp holder 4 attached to the front end of the rod 3. To the tube 2 is fixed a short tube 2a, the interior of which communicates with the interior of the tube 2. Through the tube 2a, com-

bustion gases or air can be aspirated from the patient's body. The interior diameter of the tube 2 corresponds to the exterior diameter of a catheter sleeve 6, the rear end of which is provided in the known manner with a current distributor 7 and a plug sleeve 8 and is covered by a screw 9. On a lower ring 10 of the distributor 7 is a tongue 11.

From the front end of the catheter sleeve 6 protrude two insulated tubular feet 12 the front ends of which hold a loop 13 which constitutes a cauter and is suitably of platinum or a platinum alloy. The feet 12 and the loop 13 are conveniently so curved that the vertex of the loop 13 lies in the axis of the tube 6. The loop 13, which can be fed at option either with caustic or diathermanous current, is connected to the distributor 7 by means of current-conducting strips 15 which are embedded between two silken insulating layers 16 and 18 and separated from each other by two insulators 17 (cf. Figures 7 and 8). The layers 16 and 18 lie between an interior protecting tube 14 and an exterior tube 19. The front ends of the strips 15 are rolled to the form of tubular feet 12, without the cross section of these strips being reduced, so that the loop 13 can be inserted and soldered into these feet. The catheter 6 has such an interior diameter that the optical tube 20 can be inserted into the catheter with play. The optical tube 20 has a co-axial eye-piece 21 and a co-axial objective 22.

The instrument is used as follows: The trocar sleeve 1 is inserted into the body of a subject, then the tube 2 holding the lamp 5 is slid through the trocar sleeve and, subsequently thereto, both the catheter 6 and the optical tube 20 are placed into the sleeve holding the lamp 5, the tube 20 being inserted into the catheter 6. The surgeon is thus in a position to view the loop 13 at the latest at the moment at which it emanates from the trocar sleeve.

When the catheter 6 and the loop at the front end of this catheter are being inserted, it is to be considered that the rod 3 requires the catheter 6 to assume the position illustrated in Figure 3, viz., a position in which the curvatures of the feet 13 extend towards the rod 3, so that the tube 6 can slide along the rod 3 and injuries to the insulation of the feet 12 are avoided. When the catheter 6 assumes the position shown in Figure 3, the tongue 11 on the head 7 of the catheter is being directed to the slit 23 of a bayonet groove 24 in the head 25 of the tube 2. When the tongue 11 has been inserted into the slit 23, the catheter is turned and, on account of the helical arrangement of the slit 24 the catheter 6 and the tube 2 are rigidly interconnected, the loop 13 being rotated into the position required for the operation (Figure 1), in which the loop 13 lies exactly opposite the lamp 5, and in which the objective 22 of the optical tube 20 is between the cauter feet 12 and the lamp 5. As the catheter cannot be removed from the tube 2 before the bayonet coupling is disengaged, the insulation of the feet 12 cannot be damaged by incautious manipulation of the instrument.

I claim:

1. In a thoracoscope, a straight exterior tube for introduction into a body, a lamp, a holder, the one end of said holder being fixed to said exterior tube and the other end of said holder carrying said lamp, a hollow catheter introdu-
70 ducible into said exterior tube, a cauter fixed to the catheter end to be introduced into a body,
75 and an optical tube containing an eye-piece and

an objective, said optical tube being introducible into said catheter, said exterior tube, said catheter and said optical tube being co-axial to each other, and said lamp holder being resilient and lying snugly against said catheter.

2. In a thoracoscope, a straight exterior tube for introduction into a body, a lamp, a holder, the one end of said holder being fixed to said exterior tube and the other end of said holder carrying said lamp, a hollow catheter introdu-
10 cible into said exterior tube, a cauter fixed to the catheter end to be introduced into a body, and an optical tube containing an eye-piece and an ob-
15 jective, said optical tube being introducible into said catheter, said exterior tube, said catheter and said optical tube being co-axial to each other, and said lamp holder being resilient and
20 lying snugly against said catheter, the wall of said catheter consisting of an interior tube, a thin exterior tube and two insulating layers dis-
25 posed between said two tubes, two conducting metal strips separate from each other electrically being disposed between said two insulating layers and extending from said cauter to the opposite end of said catheter.

3. In a thoracoscope, a straight exterior tube for introduction into a body, a lamp, a holder, the one end of said holder being fixed to said exterior tube and the other end of said holder carrying said lamp, a hollow catheter introdu-
30 cible into said exterior tube, a cauter fixed to the catheter end to be introduced into a body, and an optical tube containing an eye-piece and an ob-
35 jective, said optical tube being introducible into said catheter, said exterior tube, said catheter and said optical tube being co-axial to each other, and said lamp holder being resilient and
40 lying snugly against said catheter, the wall of said catheter consisting of an interior tube, a thin exterior tube and two silken layers dis-
45 posed between said two tubes, two conducting metal strips separate from each other electrically being disposed between said two insulating layers and extending from said cauter to the opposite end of said catheter.

4. In a thoracoscope, a straight exterior tube for introduction into a body, a lamp, a holder, the one end of said holder being fixed to said exterior tube and the other end of said holder carrying said lamp, a hollow catheter introdu-
50 cible into said exterior tube, a cauter fixed to the catheter end to be introduced into a body, and an optical tube containing an eye-piece and an objective, said optical tube being introducible
55 into said catheter, said exterior tube, said catheter and said optical tube being co-axial to each other, and said lamp holder being resilient and
60 lying snugly against said catheter, the wall of said catheter consisting of an interior tube, a thin exterior tube and two insulating layers dis-
65 posed between said two tubes, two conducting metal strips separate from each other electrically being disposed between said two insulating lay-
ers and extending from said cauter to the oppo-
site end of said catheter, two tubular sleeves con-
stituting the ends of the current supply strips,
said cauter being inserted into these sleeves.

5. In a thoracoscope, a straight exterior tube for introduction into a body, a lamp, a holder, the one end of said holder being fixed to said exterior tube and the other end of said holder carrying said lamp, a hollow catheter introdu-
70 cible into said exterior tube, and a looped cauter fixed to the catheter end to be introduced into a body, 75

said cauter being so formed that the vertex of the loop lies in the axis of said catheter.

5 6. In a thoracoscope, a straight exterior tube for introduction into a body, a lamp, a holder, the one end of said holder being fixed to said exterior tube and the other end of said holder carrying said lamp, a hollow catheter introducible into said exterior tube, a cauter fixed to the catheter end to be introduced into a body, and an optical
10 tube containing an eye-piece and an objective, said optical tube being introducible into said catheter, said exterior tube, said catheter and

said optical tube being co-axial to each other, and said lamp holder being resilient and lying snugly against said catheter, a bayonet groove in the tube holding said lamp, and a tongue fixed to the head of said catheter and adapted to en- 5
gage said groove so as to assure that the holding tube is introduced in a definite position with respect to said tube and to give the catheter, by rotation subsequently to introduction, the most
10 suitable working position.

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