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(54) Improvements in or relating to
 coagulator devices

(57) A device for coagulating tissue within human or animal body cavities, of the kind utilising a probe shaft 9 passing along an external shaft 1 for a conductor 17 of thermal radiation originating from a proximally connectible source, this conductor being axially displaceable by means of a focussing system with respect to an object lens or to a small glass plate 11 delimiting the probe shaft.

According to the invention, the probe shaft 9 for the heat conductor 17, and a pair of gripping tongs 5 for gripping tissue, extend parallel one beside the other through the external shaft 1 together with two parallel ducting pipes 20 21. These pipes are situated at either side of the axial plane extending through the tongs and the probe shaft and comprise slot means 24 which are directed towards the small delimiting glass plate 11 and the distal portion of the probe shaft 9.

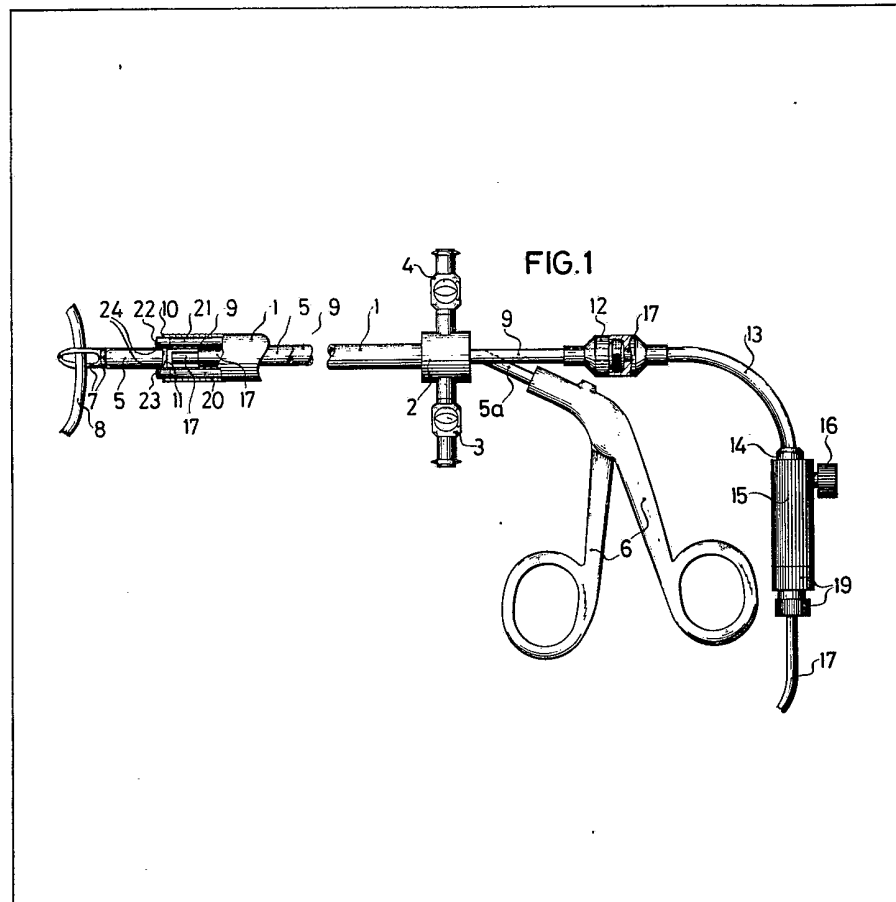


FIG.1

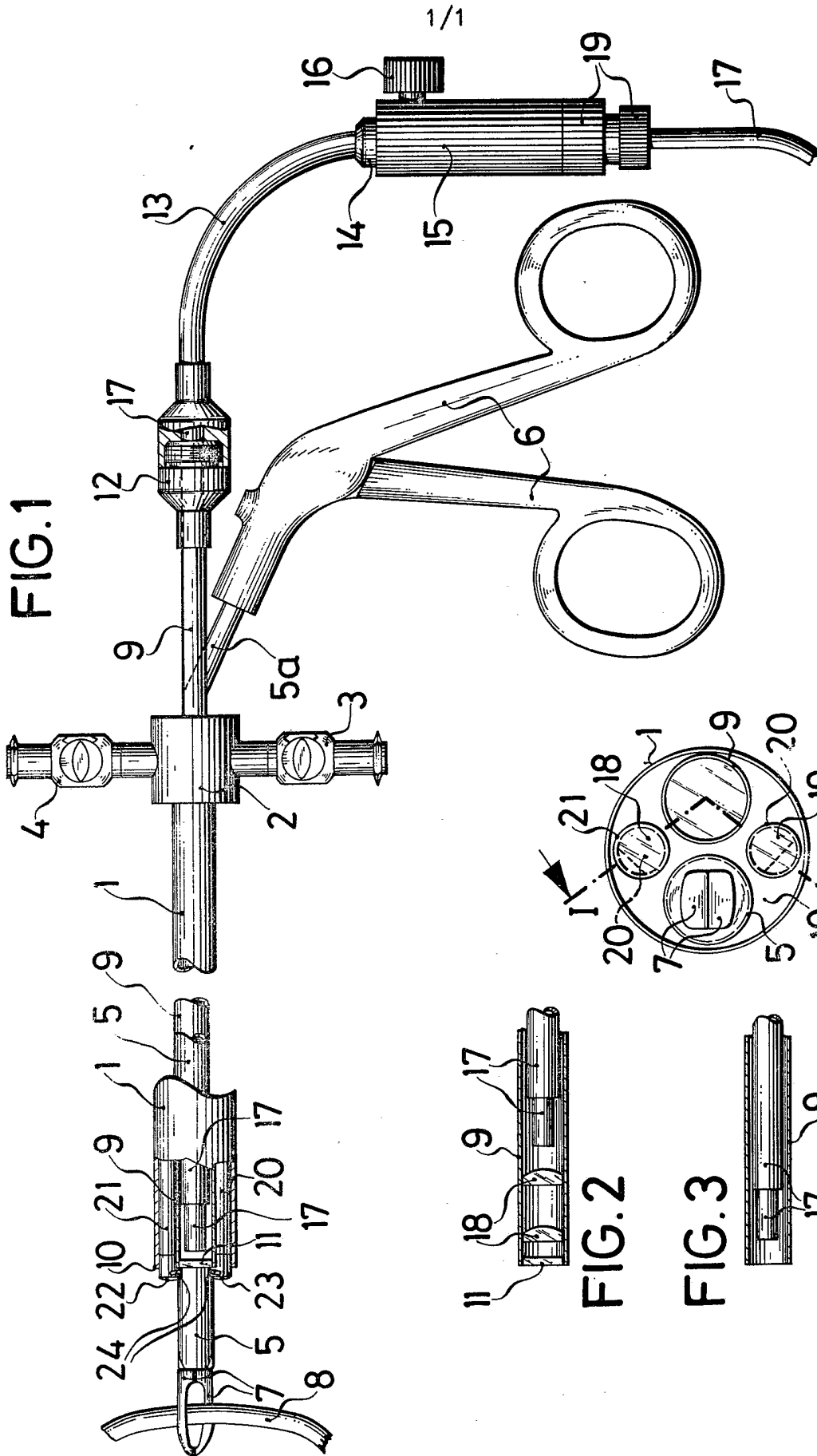


FIG.2

FIG.3

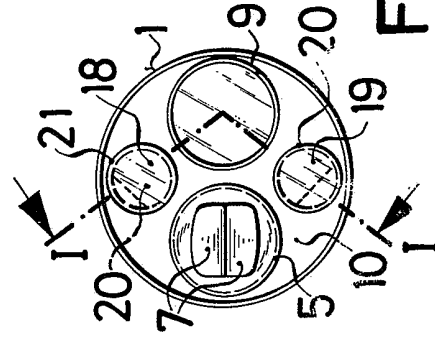


FIG.4

SPECIFICATION

Improvements in or relating to coagulator devices

5 The present invention relates to devices for coagulating tissue within human or animal body cavities, of the kind utilising a probe shaft passing along an external shaft for a conductor of thermal radiation originating from a proximally connectible source,

10 said conductor being axially displaceable by means of a focussing system with respect to an object lens or to a small glass plate delimiting said probe shaft. The thermal radiation referred to may be infrared rays or laser rays for example. Hereinafter such

15 coagulating devices will be referred to as "of the kind described".

Apart from coagulator devices which operate with electrical current or HF current, such others with which coagulating operations are performed by

20 means of infrared or laser rays are also known, as described for example in our co-pending Application No. 72315/78. Such devices in which a heat or laser emitter is arranged at the proximal extremity of a pair of forceps and whose radiation is ducted via a

25 beam guide extending through a forceps tube to the tissue section which is to be coagulated, are also known disclosed as in German Gebrauchsmuster No. 7535893.

It is an object of the invention also to combine a

30 coagulator device operated with infrared light or laser light with a pair of gripping tongs, in such manner that the tissue sections which are to be coagulated are accessible with precision whilst keeping the light beam guide unobstructed at all

35 times at the distal discharge extremity.

To achieve this and other objects, in a device of the kind described, the invention consists in that the probe shaft for the conductor of thermal radiation and a pair of gripping tongs for gripping tissue,

40 extend parallel one beside the other through the external shaft together with two parallel ducting pipes, the pipes being situated at either side of the axial plane extending through the tongs and the probe shaft and comprising slot means which are

45 directed towards the small delimiting glass plate and distal position of the probe shaft.

As a result of the construction according to the invention, it will now be possible to coagulate the tissues grasped by the forceps without any difficulty

50 under observation by means of an endoscope, since it is possible to steer the focal plane or primarily the focal point of the heat rays or laser rays precisely to the tissue section gripped by the forceps. The distal end side of the beam guide, or the small glass plate

55 terminating the locating shaft of the beam guide, is continuously blown clear, so that heat losses affecting coagulation are averted.

In order that the invention may be more clearly understood reference will now be made to the

60 accompanying drawings which show one embodiment thereof by way of example and in which:

Figure 1 shows an interrupted lateral elevation of a coagulator device in accordance with the invention, with partial axial cross-sectioning at the distal end

65 and along the broken line I-I of *Figure 4*, to an

enlarged scale.

Figure 2 shows the distal extremity of the beam guide within the guiding tube according to *Figure 1* in diagrammatical axial cross-section, but with a

70 focussing lens system,

Figure 3 shows the distal extremity of the beam guide and guiding tube according to *Figure 1* in diagrammatical axial cross-section, but without a small terminal glass plate, and

75 *Figure 4* shows an enlarged end view of the distal instrument extremity according to *Figure 1*.

Referring now to the drawings, the coagulator device comprises an external shaft 1 comprising a turned member 2 to which are connected two connectors comprising stopcocks 3 and 4, to which a protective gas, the purpose of which will be hereinafter described, may be supplied from a suitable source via hoses.

A gripping device, e.g. a pair of gripping tongs or

85 forceps 5 having with a proximal bend 5a for better handling and joined thereto a pair of scissor handles 6 for actuation of the distal forceps jaws 7 for grasping the tissue which is to be coagulated, e.g. a Fallopian tube 8, extends through the external shaft

90 1. A probe shaft or guiding tube 9 passes through the external shaft 1 parallel and adjacent to the forceps 5. The forceps 5 and the probe shaft 9 are secured in the rotatable member 2 on the one hand and distally in a delimiting plate 10, the plate 10 also being apt to be

95 transparent if a separate light-conducting fibre system, which is not illustrated, passes through the unfilled spaces in the shaft 1.

According to *Figures 1* and 2, the probe shaft 9 is distally shut off by a small glass plate 11, or is open

100 according to *Figure 3*. At the proximal extremity, the probe shaft 9 is firmly joined to a screw-threaded connector 12 which is followed by a straight or curved probe shaft portion or hose element 13 which terminates in a cylindrical sleeve 14. If the length is

105 adequate, the cylindrical sleeve 14 may also be joined directly to the connector 12, and a cylindrical case 15 is axially displaceable and secured to said cylindrical sleeve 14 by means of a set screw 16. A beam guide 17 for infrared or laser beams, which is sheathed in protective sleeving, is connected to an appropriate source of thermal radiation and is

110 inserted in axially displaceable manner through the sleeve 14, the bend 13 as well as the probe shaft 9, and terminates at the distal extremity in front of a lens system 18 or before the extremity of the probe shaft 9 which may be open or shut off by a small glass plate 11. At the proximal extremity, the beam guide 17 is joined via a cap nut 19 to the displaceable case 15 after initial adaptation of the length of the

120 beam guide inserted through the probe 9.

The case 15 and the beam guide 17 connected to the same form a focussing system whereby the beam guide 17 may be displaced in such manner that its distally emergent beam is precisely aligned

125 with the tissue which is to be coagulated within the forceps jaws 7. The focussing action may be assisted by means of the lens system 18 under alignment on a focal point.

During the coagulating operation, a protective gas

130 is conveyed through the connector stopcocks 3 and 4

and through two ducts 20 and 21 which are situated at either side of a plane extending through the forceps and the probe shaft. This protective gas emerges at the distal extremity of the ducts 20 and 5 21 closed off by caps 22 and 23 through slot-shaped nozzles 24 which are directed towards the distal extremity of the probe shaft in such manner that the small glass plate 11 or the distal end side of the beam guide 17 are blown free at all times so that 10 heat losses affecting coagulation are averted.

A light-conducting fibre system intended to illuminate the tissue to be coagulated and which occupies the unfilled space between the probe 9, the forceps 5 and the ducts 20 and 21, and which may be 15 connected at the proximal side to a projector, may complementarily extend through the external shaft 1.

The coagulator device described in the foregoing is introduced into the bodily cavity in known manner 20 of a trocar sleeve, that is to say under observation by means of an endoscope which is inserted into the bodily cavity via a second trocar sleeve. The trocar sleeve first referred to may simultaneously be used to accommodate ducting tubes providing flushing 25 and suction possibilities for the body cavity. Finally, it is also possible to combine the coagulator device with an optical observation system, to avoid a second puncture through the abdominal integument for insertion of the optical observation system.

30 CLAIMS

1. A device for coagulating tissue of the kind described, wherein the probe shaft for the conductor 35 of thermal radiation, and a pair of gripping tongs for gripping tissue, extend parallel one beside the other through the external shaft together with two parallel ducting pipes, these pipes being situated at either side of the axial plate extending through the tongs 40 and the probe shaft and comprising slot means which are directed towards the small delimitting glass plate and the distal portion of the probe shaft.

2. A device as claimed in claim 1, wherein the unfilled internal space of the external shaft is 45 occupied by light-conducting fibres for proximal connection to a light-conducting cable of a projector.

3. A device according to claim 1 or 2, wherein the probe shaft is connected proximally by means of a connector to a focussing system by means of a 50 connector to a focussing system for the conductor of thermal radiation, which is axially displaceable through the probe shaft.

4. A device as claimed in claim 3, wherein the probe shaft is connected to the focussing system via 55 a curved probe shaft portion, the conductor of thermal radiation also being axially displaceable through the curved probe shaft portion.

5. A device as claimed in any of the preceding claims, wherein the tongs are proximally fitted via an 60 unsheathed bend with scissor handles for actuating the forceps jaws.

6. A coagulator device substantially as hereinbefore described with reference to the accompanying drawings.

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