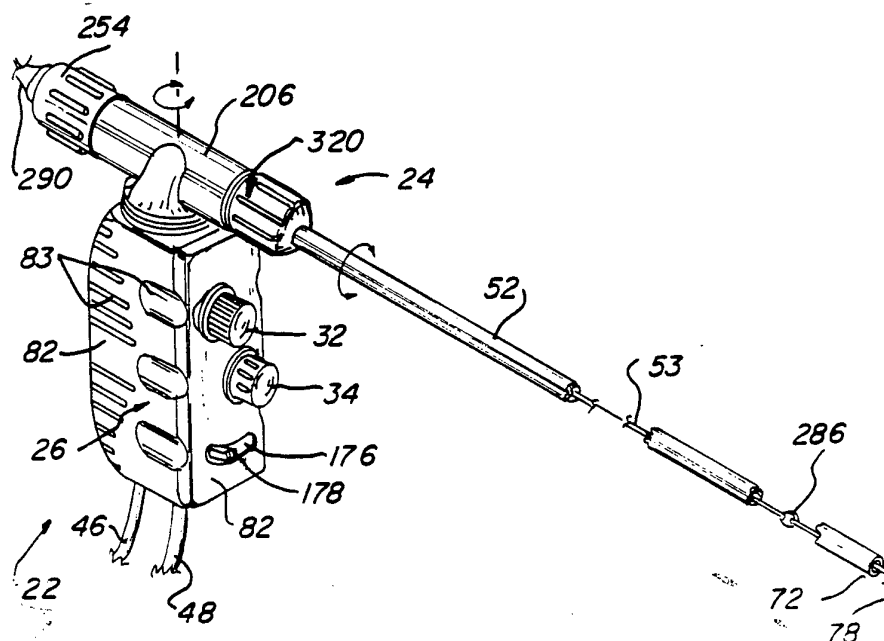




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(21) International Application Number: PCT/US93/09277 (22) International Filing Date: 29 September 1993 (29.09.93) (30) Priority data: 07/958,931 9 October 1992 (09.10.92) US (71) Applicant: BIRTCHE MEDICAL SYSTEMS, INC. [US/US]; 50 Technology Drive, Irvine, CA 92718 (US). (72) Inventors: BEUCHAT, Charles, E. ; 6 Westport, Irvine, CA 92720 (US). BURGESS, Vincent, James ; 348 30th Street, Hermosa Beach, CA 90264 (US). ETHERINGTON, Roger, F. ; 1901 Diana Lane, Newport Beach, CA 92660 (US). RICHARDS, Kent, D. ; 21552 Midcrest Drive, Lake Forest, CA 92630 (US). WALBRINK, Harold, J. ; 52 Coronado Pointe, Laguna Niguel, CA 92677 (US).		(74) Agents: CRANDELL, Ralph, F. et al.; Holland & Hart, P.O. 8749, 555 17th Street, Suite 2900, Denver, CO 80201-8749 (US). (81) Designated States: AU, BR, CA, JP, KR, NO, RU, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>With amended claims.</i> (88) Date of publication of the international search report: 18 August 1994 (18.08.94) Date of publication of the amended claims: 15 September 1994 (15.09.94)

(54) Title: MINIMALLY INVASIVE IRRIGATOR/ASPIRATOR PROBE**(57) Abstract**

An irrigator/aspirator surgical probe for laparoscopic surgery includes a rotatable handle (22) and a probe (24) having an electro-surgical electrode (78). The handle (22) has two valves (32, 34), one for controlling the flow of irrigation fluid and one for controlling the flow of aspiration fluid. One of the valves can be locked at any selected setting with a locking lever (178). Fine adjustment of the valve is achieved in the locked position. The probe assembly can be rotated relative to the handle assembly as needed to reduce operator fatigue. The probe can be rotated to position the electrode.

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[received by the International Bureau on 04 August 1994 (04.08.94);
original claims 4 and 16-47 cancelled;
claims 1, 3, 5, 11, 14 and 15 amended and renumbered
as claims 1, 3, 4, 10, 13 and 14 respectively;
new claims 15-24 added; remaining claims unchanged (10 pages)]

1. An irrigator/aspirator surgical probe to be manipulated by hand during a surgical procedure, comprising:

- 5 an elongated hollow probe tube extending generally along a longitudinal axis and having an interior space through which irrigation and aspiration fluid flows to and from a surgical site at a distal end of the probe tube; and
- 10 a handle adapted to be gripped by hand, the handle extending generally along a handle axis, the handle including an exterior gripping structure configuration extending non-annularly around the handle axis, the gripping structure configuration
- 15 adapted to accept and receive the hand in one predetermined position which is more adaptable for gripping by hand than in another position when the handle is gripped during use, the handle axis extending at a predetermined converging angle with
- 20 respect to the longitudinal axis of the probe tube, the handle rotatably connected relative to the probe tube to allow the handle to rotate about the handle axis during manipulation of the probe during use and to orient the gripping structure configuration into
- 25 the predetermined position independently of the position of the probe tube during the surgical procedure.

2. A surgical probe as defined in claim 1 wherein the predetermined angle is substantially perpendicular.

3. An irrigator/aspirator surgical probe to be manipulated by hand, comprising:

- 35 an elongated hollow probe tube extending generally along a longitudinal axis and having an interior space through which irrigation and aspiration fluid flows to and from a surgical site at a distal end of the probe tube;

which the hand extends when the handle is gripped during use, the handle axis extending at a predetermined converging angle with respect to the longitudinal axis of the probe tube, the handle
5 rotatably connected relative to the probe tube to allow the handle to rotate about the handle axis during manipulation of the probe; and

an actuation device located on the exterior of the handle for actuation by a finger of
10 the hand gripping the handle, the actuation device connected to rotate in unison with the handle, the actuation device operatively connected to control the application of at least one of the irrigation and aspiration fluid flow through the probe tube.

15 4. A surgical probe as defined in claim 3 further comprising:

a valve assembly located within the handle and operative for controlling the flow of fluid through the probe tube, the valve assembly including
20 means for connecting the valve assembly to one of a source of irrigation or aspiration fluid; and wherein:

the valve assembly includes a valve member moveable between a closed position where the fluid
25 flow within the probe tube is terminated and an open position where the fluid flow is established; and

the actuation device is operatively connected to the valve member to move the valve member between the closed position and the open
30 position.

5. A surgical probe as defined in claim 4 further comprising:

a locking device connected to the handle and selectively operative to hold the valve member
35 in an open position.

6. A surgical probe as defined in claim 5 further comprising:

a valve stem shaft connected to the valve member and operative for moving the valve member

6. A surgical probe as defined in claim 5 further comprising:

5 a valve stem shaft connected to the valve member and operative for moving the valve member between the open and closed positions, the valve stem shaft extending from the valve assembly to the exterior of the handle; and wherein:

10 the actuation device includes a control button connected to an end of the valve stem shaft at the exterior of the handle;

the locking device contacts the valve stem shaft to maintain the position of the valve stem shaft; and

15 the locking device includes selecting means extending from the handle for selectively positioning the locking device into contact with the valve stem shaft.

7. A surgical probe as defined in claim 6 wherein the valve assembly, the valve member, the valve stem shaft, the control button and the locking device all rotate in unison with the handle.

8. A surgical probe as defined in claim 6 wherein:

25 the valve assembly is removable from the handle to allow selective replacement of the valve assembly after use; and

the valve stem shaft is disconnectable from the valve member to allow the valve assembly to be removed from the handle.

30 9. A surgical probe as defined in claim 4 wherein the valve member is formed of elastomeric material.

10. A surgical probe as defined in claim 4 wherein:

35 the handle includes an opening through which the fluid flows from the valve assembly; and further comprising:

a probe housing connected to the probe tube and supporting the probe tube to extend from the probe housing, the probe housing having an interior chamber in fluid communication with the interior space in the hollow probe tube, the probe housing also including a port which communicates with the interior chamber of the probe housing; and
a rotational connection between the handle and the probe housing and operative for aligning the port and the opening in the handle to maintain fluid communication therebetween during relative rotation of the handle and the probe housing.

11. A surgical probe as defined in claim 10 further comprising:

a confluence chamber connected to the valve assembly and extending through the opening and into the port of the probe housing;

a sleeve extending from the probe housing at the port and into the opening in the housing, the sleeve extending into adjacency with the confluence chamber, the fluid communication with the interior chamber of the probe assembly occurring through the confluence chamber and the sleeve; and

a sealing member positioned between the confluence chamber and the sleeve to seal the fluid flow between the confluence chamber and the interior of the probe housing.

12. A surgical probe as defined in claim 11 further comprising:

a second sealing member in addition to the sealing member first aforesaid, the second sealing member positioned between the probe housing and the handle at a location adjacent the port and the opening in the housing.

13. A surgical probe as defined in claim 3 wherein the probe tube is connected to the handle to allow selective rotation of the probe tube about the

longitudinal axis through the probe tube and relative to the handle axis.

14. A surgical probe as defined in claim 3 wherein:

5 the probe tube extends to a distal end which is adapted to be positioned at a site where the surgical procedure is performed, and further comprising:

10 means for supporting a surgical instrument within the hollow probe tube and extending from the distal end of the tube, the support and size of the surgical instrument allowing a space between the probe tube and the surgical instrument for the flow of fluid, the supporting means further allowing
15 removal of the surgical instrument from within the probe tube at a distal end of the probe tube.

15. A surgical probe as defined in claim 4 wherein:

20 the handle includes an exterior non-annular gripping structure configuration adapted to accept and receive the hand in one predetermined position which is more adaptable for gripping by hand than in another position; and

25 the actuator means is located in a position relative to the gripping structure configuration to allow finger operation of the actuator means from the hand gripping the gripping structure configuration in the predetermined position.

30 16. A surgical probe as defined in claim 5 wherein:

35 the handle includes an exterior non-annular gripping structure configuration adapted to accept and receive the hand in one predetermined position which is more adaptable for gripping by hand than in another position; and

the locking device is located in a position on the gripping structure configuration to allow finger operation of the locking device from the hand gripping the gripping structure configuration in the predetermined position.

17. A surgical probe as defined in claim 5 wherein:

the locking device also rotates in unison with the handle.

18. A surgical probe as defined in claim 6 wherein:

the handle includes an exterior non-annular gripping structure configuration adapted to accept and receive the hand in one predetermined position which is more comfortable for gripping by hand than in another position; and

the control button is located in a position relative to the gripping structure configuration to allow finger operation of the control button from the hand gripping the gripping structure configuration in the predetermined position.

19. An irrigator/aspirator surgical probe to be manipulated by hand, comprising:

an elongated hollow probe tube extending generally along a longitudinal axis and having an interior space through which irrigation and aspiration fluid flows to and from a surgical site at a distal end of the probe tube;

a handle adapted to be gripped by hand, the handle extending generally along a handle axis which the hand extends when the handle is gripped during use, the handle axis extending at a predetermined converging angle with respect to the longitudinal axis of the probe tube, the handle rotatably connected relative to the probe tube to

allow the handle to rotate about the handle axis during manipulation of the probe;

an actuation device located on the exterior of the handle to control the application of
5 at least one of the irrigation and aspiration fluid flow through the probe tube;

a valve assembly located within the handle and operative for controlling the flow of fluid through the probe tube, the valve assembly including
10 means for connecting the valve assembly to one of a source of irrigation or aspiration fluid, the valve assembly including a valve member moveable between a closed position where the fluid flow within the probe tube is terminated and an open position where
15 the fluid flow is established;

a locking device connected to the handle and selectively operative to hold the valve member in an open position; and

a valve stem shaft connected to the valve
20 member and operative for moving the valve member between the open and closed positions, the valve stem shaft extending from the valve assembly to the exterior of the handle; and wherein:

the actuation device is operatively
25 connected to the valve member to move the valve member from the closed position to the open position;

the actuation device includes a control button connected to an end of the valve stem shaft
30 at the exterior of the handle;

the locking device contacts the valve stem shaft to maintain the position of the valve stem shaft;

the locking device includes selecting
35 means extending from the handle for selectively positioning the locking device into contact with the valve stem shaft; and

the valve assembly, the valve member, the valve stem shaft, the control button and the locking device all rotate in unison with the handle.

20. An irrigator/aspirator surgical probe to
5 be manipulated by hand, comprising:

an elongated hollow probe tube extending generally along a longitudinal axis and having an interior space through which irrigation and aspiration fluid flows to and from a surgical site
10 at a distal end of the probe tube;

a handle adapted to be gripped by hand, the handle extending generally along a handle axis which the hand extends when the handle is gripped during use, the handle axis extending at a
15 predetermined converging angle with respect to the longitudinal axis of the probe tube, the handle rotatably connected relative to the probe tube to allow the handle to rotate about the handle axis during manipulation of the probe;

20 a valve assembly located within the handle and operative for controlling the flow of fluid through the probe tube, the valve assembly including means for connecting the valve assembly to one of a source of irrigation or aspiration fluid, the valve
25 assembly including a valve member moveable between a closed position where the fluid flow within the probe tube is terminated and an open position where the fluid flow is established;

a valve stem shaft connected to the valve
30 member and operative for moving the valve member between the open and closed positions, the valve stem shaft extending from the valve assembly to the exterior of the handle;

an actuation device located on the
35 exterior of the handle and operatively connected to the valve stem shaft to move the valve member between the open and closed positions;

the actuation device includes a control button connected to an end of the valve stem shaft at the exterior of the handle;

5 the locking device contacts the valve stem shaft to maintain the position of the valve stem shaft;

10 the locking device includes selecting means extending from the handle for selectively positioning the locking device into contact with the valve stem shaft;

the valve assembly is removable from the handle to allow selective replacement of the valve assembly after use; and

15 the valve stem shaft is disconnectable from the valve member to allow the valve assembly to be removed from the handle.

21. A surgical probe as defined in claim 20 further comprising:

20 a locking device connected to the handle and selectively operative to hold the valve member in an open position.

22. A surgical probe as defined in claim 21 further comprising:

25 a valve stem shaft connected to the valve member and operative for moving the valve member between the open and closed positions, the valve stem shaft extending from the valve assembly to the exterior of the handle; and wherein:

30 the actuation device includes a control button connected to an end of the valve stem shaft at the exterior of the handle;

the locking device contacts the valve stem shaft to maintain the position of the valve stem shaft; and

35 the locking device includes selecting means extending from the handle for selectively

positioning the locking device into contact with the valve stem shaft.

23. A surgical probe as defined in claim 22 wherein the valve assembly, the valve member, the valve stem shaft, the control button and the locking device all rotate in unison with the handle.

24. An irrigator/aspirator surgical probe to be manipulated by hand, comprising:

an elongated hollow probe tube extending generally along a longitudinal axis and having an interior space through which irrigation and aspiration fluid flows to and from a surgical site at a distal end of the probe tube, the distal end of the probe tube adapted to be positioned at a site where the surgical procedure is performed;

a handle adapted to be gripped by hand, the handle extending generally along a handle axis which the hand extends when the handle is gripped during use, the handle axis extending at a predetermined converging angle with respect to the longitudinal axis of the probe tube, the handle rotatably connected relative to the probe tube to allow the handle to rotate about the handle axis during manipulation of the probe; and

means for supporting a surgical instrument within the hollow probe tube and extending from the distal end of the tube, the support and size of the surgical instrument allowing a space between the probe tube and the surgical instrument for the flow of fluid, the supporting means further allowing removal of the surgical instrument from within the probe tube at a distal end of the probe tube.