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[Continued on next page]

(54) Title: BOWED TIP FOR LAPAROSCOPIC SURGERY

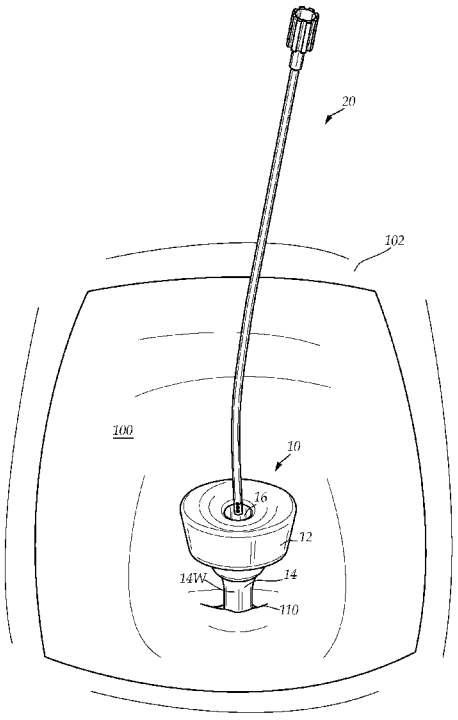

FIG. 1

(57) Abstract: An irrigation and suction tip (20) for laparoscopic surgery having an increased range of transport within a surgical cavity during laparoscopic surgery. The tip (20) moves in a circumferential trajectory rather than linearly when a surgeon is irrigating and suctioning tissue. The tip is substantially resilient, withstanding great force and pressure during irrigation and suction procedures. The tip (20) is bowed, having a pair of straight portions, a short distal portion (20D) and a long proximal portion (20P) joined by a bowed portion, (20B) the bowed portion allowing the distal portion to rotate, circumscribing a large area. The bow is limited so that the tip moves within a narrow wall of a cannula (14) of a trocar.

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
23 April 2015

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 14/13316

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61M 5/00 (2015.01)
CPC - A61B 17/3421; A61M 3/0279
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - A61M 5/00 (2015.01)
CPC - A61B 17/3421; A61M 3/0279

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
604/39-45, 264
(Search term limited; see below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWest (PGPB, USPT, EPAB, JPAB); Google; PatBase (All);
Search Terms: Aspirat*, suction*, vacuum*, infus*, irrigat*, deliver*, inject*, fluid*, liquid*, agent*, composition*, drug*, cannula, probe, distal, tip, end, bend, bent, curve*, precurv*, angle*, trocar, laparoscop*, laparascop*, apertures, holes, openings, ports, channels

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 2008/0200972 A1 (RITTMAN et al.) 21 August 2008 (21.08.2008) Entire document, especially Abstract, para[0011], para[0082], para[0093], para[0120] and FIGS. 4, 7-9.	1, 6-7 --- 2-5, 8-11
X	US 2007/0255230 A1 (GROSS et al.) 01 November 2007 (01.11.2007) Entire document, especially Abstract, para[0029]- para[0041], para[0060]- para[0071] and FIGS. 1-17.	1
X	US 2007/0276352 A1 (CROCKER et al.) 29 November 2007 (29.11.2007) Entire document, especially Abstract, para[0027], para[0039], para[0071]- para[0076], para[0103]- para[0105] and FIGS. 1, 11.	1
Y	US 2007/0197856 A1 (GELLMAN et al.) 23 August 2007 (23.08.2007) Entire document, especially Abstract, para[0042], para[0047]- para[0048].	2-4, 8-11
Y	US 2009/0099546 A1 (MACY) 16 April 2009 (16.04.2009) para[0034].	5
A	US 2008/0045927 A1 (GOEBEL et al.) 21 February 2008 (21.02.2008) Entire document.	1-11
A	US 2011/0213333 A1 (MCGUCKIN) 01 September 2011 (01.09.2011) Entire document.	1-11
A	US 6,129,713 A (MANGOSONG et al.) 10 October 2000 (10.10.2000) Entire document.	1-11
A	US 6,375, 648 B1 (EDELMAN et al.) 23 April 2002 (23.04.2002) Entire document.	1-11
A	US 2005/043682 A1 (KUCKLICK et al.) 24 February 2005 (24.02.2005) Entire	1-11

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 February 2015 (02.02.2015)	20 FEB 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 14/13316

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I (Claims 1-11) is drawn a suction and irrigation catheter with a preformed curve

Group II (Claims 12-16) is drawn to a method of manufacturing a suction and irrigation catheter with a preformed curve

Group III (Claims 17-19) is drawn to a method of using a suction and irrigation catheter with a preformed curve

The inventions listed as Groups I - III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

---- see continuation sheet ---

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-11

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/13316

---------- Continuation of Box III: Observations where unity of invention is lacking (Continuation of item 3 of first sheet) ----------

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I (Claims 1-11) is drawn a suction and irrigation catheter with a preformed curve

Group II (Claims 12-16) is drawn to a method of manufacturing a suction and irrigation catheter with a preformed curve

Group III (Claims 17-19) is drawn to a method of using a suction and irrigation catheter with a preformed curve

The inventions listed as Groups I - III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Group I-III are related to an apparatus (Group I) and method(s) of making the apparatus (Group II) and method of using the apparatus (Group III). These groups therefore share the technical features of the apparatus of claim 1, however, these shared technical features fail to provide a contribution over the prior art of US 2008/0200972 A1 to Rittman et al. (hereinafter: Rittman).. Rittman teaches a suction and irrigation tip (16, FIGS. 4, 7-8; para[0082]) for inserting into a trocar (FIGS. 32, 34, 36; para[0120]), comprising:
a hollow tube having a wall (tube 16 with passageway 24, FIGS. 4, 7-9; para[0081]-[0082]), said tube having a distal portion having a blunt distal end (20, FIGS. 4, 7-9), said tube having a proximal portion, the proximal portion substantially straight, defining an imaginary straight reference line (FIGS. 4, 7-8), the proximal portion having a proximal end, said proximal end exterior to a trocar when said tube is inserted therein (FIGS. 1, 32, 34, 36; para[0120]);
a plurality of apertures (30, FIGS. 4, 7-8) on the wall of the tube adjacent to said blunt distal end, the apertures disposed on the wall operative for an egress of irrigation fluid flowing through the hollow tube during an irrigation procedure and operative for an ingress of tissue and fluid into the hollow tube during a suction procedure (para[0088]); and
a bow portion (defined by angle phi in FIG. 4) connecting the distal portion (20) and the proximal portion of the hollow tube, the bow portion in fluid communication with the proximal portion and the distal portion, the bow portion producing a curve in the tube (FIG. 4, 7-9), the curve having an angle, the angle (phi, FIG. 4) subtending the bow portion with the imaginary straight reference line of the proximal portion, the curve enabling the blunt distal end of the tube to circumscribe a large area while manipulating the proximal end of the tube without manipulating the trocar, said trocar having said tube inserted therein (para[0081],[0093], FIGS. 4, 6-8).

Thus, Groups I-III lack unity of invention because they do not share a same or corresponding special technical feature providing a contribution over the prior art.