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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	02/14/2017	9566106	153190	1030

25944 7590 01/25/2017

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

OLYMPUS CORPORATION, Hachioji-shi, Tokyo, JAPAN;
Hideo SANAI, Hachioji-shi, JAPAN;

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

OLIFF PLC
277 S Washington St.
Suite 500
Alexandria, Virginia 22314

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

TITLE OF INVENTION: SURGICAL DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960.00			$960.00	01/25/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
J. E. Della	3739	606-045

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- [ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- [ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Oliff PLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: OLYMPUS CORPORATION

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Tokyo, Japan

Please check the appropriate assignee category or categories (will not be printed on the patent) : [ ] Individual [x] Corporation or other private group entity [ ] Government

4a. The following fee(s) are submitted:
- [x] Issue Fee
- [ ] Publication Fee (No small entity discount permitted)
- [ ] Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- [ ] A check is enclosed.
- [ ] Payment by credit card. Form PTO-2038 is attached.
- [x] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 15-0461 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- [ ] Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- [ ] Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- [ ] Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Bryan K. Hsu/ Date January 4, 2017

Typed or printed name Bryan K. Hsu Registration No. 72,762

Electronic Patent Application Fee Transmittal

Application Number:	14163528
Filing Date:	24-Jan-2014
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Filer:	James Albert Oliff/Darrisaw Tatum
Attorney Docket Number:	153190

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	27970177
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Darrisaw Tatum
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	04-JAN-2017
Filing Date:	24-JAN-2014
Time Stamp:	16:35:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$960
RAM confirmation Number	010517INTEFSW00003288150461
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal.pdf	33558 1621895d5fe6408e977503d82b712df003174f5d	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30565 d7a6ffcae9fd060abec7446d956c8ae11f9607a7	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	64123		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/163,528	01/24/2014	3739	1740	153190	7	1

CONFIRMATION NO. 1030

CORRECTED FILING RECEIPT

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC000000088170270

Date Mailed: 12/29/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Hideo SANAI, Hachioji-shi, JAPAN;

Applicant(s)

OLYMPUS CORPORATION, Hachioji-shi, Tokyo, JAPAN;

Assignment For Published Patent Application

OLYMPUS CORPORATION, Hachioji-shi, Tokyo, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 25944

Domestic Priority data as claimed by applicant

This application is a CON of PCT/JP2013/060447 04/05/2013
which claims benefit of 61/636,269 04/20/2012

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/07/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/163,528**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

SURGICAL DEVICE

Preliminary Class

606

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014

For: SURGICAL DEVICE

Attn: OIPE

Group Art Unit: 3739

Docket No.: 153190

REQUEST TO UPDATE NAME OF APPLICANT AND REQUEST FOR CORRECTION OF PALM RECORDS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attached is an Updated Application Data Sheet and marked-up original filing receipt updating the name and address of the Applicant.

In compliance with 37 CFR §3.73(c), the undersigned hereby states that OLYMPUS CORPORATION is the assignee of the entire right, title, and interest in the patent application identified above by virtue of an assignment from the inventors or previous owner(s) of the patent application identified above. A copy of the assignment is attached hereto and is concurrently being submitted for recordation.

The undersigned is authorized to act on behalf on the assignee by virtue of the Power of Attorney submitted herewith. In accordance with 37 CFR §1.36(a), submission of this Power of Attorney revokes any powers of attorney previously given.

Entry of these documents should satisfy the requirements set forth under 37 CFR §3.73(c) to update the name of the Applicant. Therefore, prompt issuance of an Official Filing Receipt bearing the updated name of the Applicant is respectfully solicited.

Respectfully submitted,

/Bryan K. Hsu/

James A. Oliff
Registration No. 27,075

Bryan K. Hsu
Registration No. 72,762

JAO:BKH/cfr

Date: December 23, 2016

Attachments:
Updated Application Data Sheet
Assignment
General Power of Attorney

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UPDATED

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hideo		SANAI	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hachioji-shi	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o OLYMPUS I.P. SERVICES CO., LTD.		
Address 2	I.P. Support Dept., 2-3 Kuboyama-cho		
City	Hachioji-shi, Tokyo	**State/Province**	
Postal Code	192-8512	**Country** i	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	25944		
Email Address	email@oliff.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURGICAL DEVICE		
Attorney Docket Number	153190	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	25944		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	PCT/JP2013/060447	2013-04-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/JP2013/060447	non provisional of	61/636,269	2012-04-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[1] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)

Remove

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(•) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	~~OLYMPUS MEDICAL SYSTEMS CORP.~~ OLYMPUS CORPORATION		
Mailing Address Information For Applicant:			
Address 1	~~43-2, Hatagaya 2-chome, Shibuya-ku~~ 2951 Ishikawa-machi		
Address 2			
City	~~Tokyo~~ Hachioji-shi, Tokyo	**State/Province**	
Country	JP	Postal Code	192-8507
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

If the Assignee is an Organization check here. ☒

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Organization Name			
Mailing Address Information For Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country [i]		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature	Bryan Hsu			Date (YYYY-MM-DD)	12/23/2016
First Name	Bryan	Last Name	Hsu	Registration Number	72762

Additional Signature may be generated within this form by selecting the Add button.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Co o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DECLARATION

I, Kenichiro Ono of Shinjuku Monolith, 3-1 Nishi-Shinjuku 2-chome, Shinjuku-ku, Tokyo, Japan, understand both English and Japanese, am the translator of the English document attached, and do hereby declare and state that the attached English document contains an accurate translation of Certificate of full registry records of Olympus Corporation and that all statements made herein are true to the best of my knowledge.

Declared in Tokyo, Japan
July 8, 2016

K. Ono

Kenichiro Ono

Certificate of full registry records

2951 Ishikawa-machi, Hachioji-shi, Tokyo
Olympus Corporation

Corporate number	0110-01-005222
Corporate Name	Olympus Corporation
Head Office	2951 Ishikawa-machi, Hachioji-shi, Tokyo
Method of Public Notice	Made through electronic public notice. http://www.olympus.co.jp/jp/ir/ However, if the Company is unable to make a public announcement through the electronic public announcement due to accidents or other circumstances in which it is unable to make an electronic public announcement, public notices shall be given on the Nihon Keizai Shimbun.
Date of Incorporation	October 12, 1919
Purposes	1. Manufacture, sale, repair and leasing of microscopes, cameras, precision measuring instruments and other optical devices; 2. Manufacture, sale, repair and leasing of medical equipment, veterinary equipment, office equipment and other general purpose devices and equipment; 3. Manufacture, sale, repair and leasing of electrical and communications devices and equipment; 4. Manufacture and sale of pharmaceuticals, quasi-drugs, cosmetics, industrial chemicals and chemical substances; 5. Manufacture and sale of food products and animal feed; 6. Development and sale of software, computerized data processing and repair and leasing of computers; 7. Information service using communication networks; 8. Export and import of each of the foregoing items and products related thereto; 9. Laboratory testing and water quality analysis on contract; 10. Purchase and sale of used goods; 11. Personnel dispatchment business; 12. Non-life insurance agency business; 13. Travel agency business; 14. Industrial and general waste disposal business; 15. Leasing, sale and purchase of real estate and real estate agency business; 16. Construction planning and construction works on a contract basis; 17. Investment and consulting business; 18. Other activities incidental or related to any of the foregoing items.
Number of Stocks for One Unit	100shares
Total Number of Stocks Authorized to be Issued	1,000,000,000 shares

2951 Ishikawa-machi, Hachioji-shi, Tokyo
Olympus Corporation

Total Number of Issued Stocks, Classes and Number of Such Stocks	Total number of issued stocks: 342,671,508 shares	
Total Amount of Capital	¥124,520,292,789	
Name, Address and Place of Share Registration Agent	Sumitomo Mitsui Trust Bank, Limited 4-1, Marunouchi 1-Chome, Chiyoda-ku, Tokyo Sumitomo Mitsui Trust Bank, Limited Stock Transfer Agency Business Planning Department 4-1, Marunouchi 1-Chome, Chiyoda-ku, Tokyo	
Matters Pertaining Directors and Auditors	(Director) Hiroyuki Sasa	June 26 2015 (reassumed)
	(Director) Yasuo Takeuchi	June 26 2015 (reassumed)
	(Director) Shigeo Hayashi	June 26 2015 (reassumed)
	(Director) Takuya Goto	June 26 2015 (reassumed)
	(Director) Shiro Hiruta	June 26 2015 (reassumed)
	(Director) Sumitaka Fujita	June 26 2015 (reassumed)
	(Director) Motoyoshi Nishikawa	June 26 2015 (reassumed)
	(Director) Keiko Unotoro	June 26 2015 (reassumed)
	(Director) Akihiro Taguchi	June 26 2015 (assumed)
	(Director)Haruo Ogawa	June 26 2015 (assumed)

2951 Ishikawa-machi, Hachioji-shi, Tokyo
Olympus Corporation

	2115,15-1,Nishishinjuku 6-Chome, Shinjuku-ku, Tokyo (Representative Director) Hiroyuki Sasa	June 26,	2015	(reassumed)
	51-2, Yoyogi 4-Chome, Shibuya-ku, Tokyo (Representative Director) Hiroyuki Sasa	April 1 April 21	2016 2016	(translate of address) (registered)
	(Corporate Auditor) Takashi Saito	April 20,	2012	(assumed)
	(Corporate Auditor) Masashi Shimizu	April 20,	2012	(assumed)
	(Corporate Auditor) Nobuo Nagoya (Outside Corporate Auditor)	April 20,	2012	(assumed)
	(Corporate Auditor) Katsuya Natori (Outside Corporate Auditor)	April 20,	2012	(assumed)
	(Accounting Auditors) Ernst & Young ShinNihon LLC	June 26	2015	(resigned)
Outside Directors' and Outside Auditor's limitation of Liability	Pursuant to Article 427, Paragraph 1 of the Company Law, the Company may enter into contracts with outside directors limiting the liability for damage of outside directors in connection with their negligence of duties. Maximum liability, however, shall be the amount as set forth in applicable laws and regulations.			
	Pursuant to Article 427, Paragraph 1 of the Company Law, the Company may enter into contracts with outside auditors limiting the liability for damages of outside auditors in connection with their negligence of duties. Maximum liability, however, shall be the amount set forth in applicable laws and regulations.			
Warrant	The 1st stock acquisition rights Number of the Warrants 397warrants Class and number of the underlying shares, and the method of calculation of those The common stock of the Company 39,700 shares The underlying shares for the Warrants for Subscription shall be the common stock of the Company granted in units of 100 shares per warrant (hereafter referred to as the "Number of Granted Shares"). In the event the Company carries out a stock split, bonus share allotment, or reverse stock split in respect of the common stock of the Company after the allotment date, the Number of Granted Shares shall be adjusted accordingly by the following formula with the resulting fractions of shares omitted. Number of the Granted Shares after adjustment = Number of Granted Shares before adjustment × Ratio of stock split, bonus share allotment or reverse stock split			

The Number of Granted Shares after adjustment shall be applied after the date following the record date for the stock split or bonus share allotment in the case of the stock split or bonus share allotment, and in the case of the reverse stock split the date following its effective date. In the event, however, that the stock split or bonus share allotment is carried out on the condition that the motion to increase capital or a reserve by decreasing the amount of surplus is approved by the general meeting of shareholders of the Company, and a date before the conclusion of the said general meeting is set as the record date for the stock split or bonus share allotment, the Number of Granted Shares after the adjustment shall be applied after the date following the date of the conclusion of the said general meeting of shareholders.

In the event the warrant survives the Company after a corporate merger of either the absorption or consolidation type, or an exchange or transfer of shares which renders the Company a wholly-owned subsidiary, the Number of Granted Shares may be adjusted as deemed necessary according to the ratio of the merger, exchange or transfer. Should the Number of Granted Shares be adjusted, the Company will provide the details by a notice or public announcement to the persons holding the Warrants on record in the stock option registry (hereafter referred to as the "Warrant Holders") on or before the day before the effective date of the adjustment of the Number of Granted Shares. Should the Company be unable to issue the notice or public announcement on or before the day before the said effective date, the Company will make the notice or public announcement without further delay.

The paid-in amount for the warrant, the method of calculation of the warrant or the unnecessariness of the paid-in for the warrant

The amount to be paid in for each Warrant shall be the amount calculated by multiplying a value of the option price (with a fraction less than 1 yen rounded up) per share calculated using the Black-Scholes Model based on the basic figures provided in (2) to (7) below by the Number of the Granted Shares.

$$C = Se^{-qT}N(d) - Xe^{-rT}N\left(d - \sigma\sqrt{T}\right)$$

where

$$d = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

(1) Option price per share (C)

(2) Share price (S): Closing price for the regular trading of the common shares of the Company at the Tokyo Stock Exchange on August 26, 2013 (if no closing price is available, the base price for the next trading day);

(3) Exercise price (X): 1 yen

(4) Estimated residual period (T): 15 years

(5) Volatility (δ): Price volatility calculated from the closing prices for the regular trading of the common shares of the Company on the last trading day of each week during the 15-year period (from August 27, 1998 to August 26, 2013);

(6) Risk-free interest rate (γ): Interest rate of the government bonds the years remaining to maturity of which correspond the estimated residual period;

(7) Dividend yield (q): Dividend per share (a simple average of the actual dividends paid in the most recent two fiscal periods) ÷ share price determined in Item (2) above

(8) Cumulative distribution function (N(・))

* Assumes a setting off of the right to demand remuneration of the allottees against the obligation for payment for the Warrant

Value of the properties contributed in the exercise of the warrant, or the method of calculation of it

	The value of the properties contributed in the exercise of each Warrant shall be the amount calculated by multiplying 1 yen per share to be delivered in the exercise of the Warrant for Subscription by the Number of Granted Shares. Exercise period From August 27, 2013 to August 26, 2043 Conditions for the exercise of the warrants (1) The exercise of the Warrant by a Warrant Holder who is no longer in the position of either director or executive officer of the Company is limited to the period of 10 years from one year after the day following the date on which he loses the status. (2) Should a Warrant Holder is appointed as an auditor after his resignation from the position of director or executive officer, the exercise of his Warrant shall be limited to a period of 10 years from one year after the date on which he loses the position of the auditor. (3) In the event of the death of a warrant holder, the Warrant may be exercised by his heir. (4) The Warrant Holder may exercise all or part of his Warrants. Matters and requirements for the acquisition of the warrants In the event in which the Board of Directors of the Company approves (or passes the resolution if a resolution of the general meeting of shareholders is not required) one of the resolutions set out in Paragraphs (1), (2), (3), (4) or (5) below, the Company may acquire the Warrants without compensation on the date separately determined by the Board of Directors. (1) Resolution to approve a merger agreement under which the Company is absorbed; (2) Resolution to approve an agreement for a company split or a plan for an incorporation-type company split by which the Company is split; (3) Resolution to approve a share exchange agreement or a share transfer plan under which the Company becomes a wholly-owned subsidiary; (4) Resolution to approve an amendment to the Articles of Incorporation to provide for the requirement of the approval of the Company in respect of all classes of the shares issued by the Company in the event of the acquisition of such shares by assignment; or (5)Resolution to approve an amendment to the Articles of Incorporation with respect to the underlying shares or classes of shares for the Warrant of which the acquisition by assignment requires the approval of the Company to provide for the requirement for the Company to acquire all shares by a resolution of the General Meeting of Shareholders
	The 2st stock acquisition rights Number of the Warrants 410warrants Class and number of the underlying shares, and the method of calculation of those The common stock of the Company 41,000 shares The underlying shares for the Warrants for Subscription shall be the common stock of the Company granted in units of 100 shares per warrant (hereafter referred to as the "Number of Granted Shares"). In the event the Company carries out a stock split, bonus share allotment, or reverse stock split in respect of the common stock of the Company after the allotment date, the Number of Granted Shares shall be adjusted accordingly by the following formula with the resulting fractions of shares omitted. Number of the Granted Shares after adjustment = Number of Granted Shares before adjustment × Ratio of stock split, bonus share allotment or reverse stock split

The Number of Granted Shares after adjustment shall be applied after the date following the record date for the stock split or bonus share allotment in the case of the stock split or bonus share allotment, and in the case of the reverse stock split the date following its effective date. In the event, however, that the stock split or bonus share allotment is carried out on the condition that the motion to increase capital or a reserve by decreasing the amount of surplus is approved by the general meeting of shareholders of the Company, and a date before the conclusion of the said general meeting is set as the record date for the stock split or bonus share allotment, the Number of Granted Shares after the adjustment shall be applied after the date following the date of the conclusion of the said general meeting of shareholders.

In the event the warrant survives the Company after a corporate merger of either the absorption or consolidation type, or an exchange or transfer of shares which renders the Company a wholly-owned subsidiary, the Number of Granted Shares may be adjusted as deemed necessary according to the ratio of the merger, exchange or transfer. Should the Number of Granted Shares be adjusted, the Company will provide the details by a notice or public announcement to the persons holding the Warrants on record in the stock option registry (hereafter referred to as the "Warrant Holders") on or before the day before the effective date of the adjustment of the Number of Granted Shares. Should the Company be unable to issue the notice or public announcement on or before the day before the said effective date, the Company will make the notice or public announcement without further delay.

The paid-in amount for the warrant, the method of calculation of the warrant or the unnecessariness of the paid-in for the warrant

The amount to be paid in for each Warrant shall be the amount calculated by multiplying a value of the option price (with a fraction less than 1 yen rounded up) per share calculated using the Black-Scholes Model based on the basic figures provided in (2) to (7) below by the Number of the Granted Shares.

$$C = Se^{-qT}N(d) - Xe^{-rT}N\left(d - \sigma\sqrt{T}\right)$$

where

$$d = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

(1) Option price per share (C)

(2) Share price (S): Closing price for the regular trading of the common shares of the Company at the Tokyo Stock Exchange on July 11, 2014 (if no closing price is available, the base price for the next trading day);

(3) Exercise price (X): 1 yen

(4) Estimated residual period (T): 15 years

(5) Volatility (δ): Price volatility calculated from the closing prices for the regular trading of the common shares of the Company on the last trading day of each week during the 15-year period (from July 12, 1999 to July 11, 2014);

(6) Risk-free interest rate (γ): Interest rate of the government bonds the years remaining to maturity of which correspond the estimated residual period;

(7) Dividend yield (q): Dividend per share (a simple average of the actual dividends paid in the most recent two fiscal periods) ÷ share price determined in Item (2) above

(8) Cumulative distribution function (N(・))

* Assumes a setting off of the right to demand remuneration of the allottees against the obligation for payment for the Warrant

	Value of the properties contributed in the exercise of the warrant, or the method of calculation of it The value of the properties contributed in the exercise of each Warrant shall be the amount calculated by multiplying 1 yen per share to be delivered in the exercise of the Warrant for Subscription by the Number of Granted Shares. Exercise period From July 12, 2014 to July 11, 2044 Conditions for the exercise of the warrants (1) The exercise of the Warrant by a Warrant Holder who is no longer in the position of either director or executive officer of the Company is limited to the period of 10 years from one year after the day following the date on which he loses the status. (2) Should a Warrant Holder is appointed as an auditor after his resignation from the position of director or executive officer, the exercise of his Warrant shall be limited to a period of 10 years from one year after the date on which he loses the position of the auditor. (3) In the event of the death of a warrant holder, the Warrant may be exercised by his heir. (4) The Warrant Holder may exercise all or part of his Warrants. Matters and requirements for the acquisition of the warrants In the event in which the Board of Directors of the Company approves (or passes the resolution if a resolution of the general meeting of shareholders is not required) one of the resolutions set out in Paragraphs (1), (2), (3), (4) or (5) below, the Company may acquire the Warrants without compensation on the date separately determined by the Board of Directors. (1) Resolution to approve a merger agreement under which the Company is absorbed; (2) Resolution to approve an agreement for a company split or a plan for an incorporation-type company split by which the Company is split; (3) Resolution to approve a share exchange agreement or a share transfer plan under which the Company becomes a wholly-owned subsidiary; (4) Resolution to approve an amendment to the Articles of Incorporation to provide for the requirement of the approval of the Company in respect of all classes of the shares issued by the Company in the event of the acquisition of such shares by assignment; or (5)Resolution to approve an amendment to the Articles of Incorporation with respect to the underlying shares or classes of shares for the Warrant of which the acquisition by assignment requires the approval of the Company to provide for the requirement for the Company to acquire all shares by a resolution of the General Meeting of Shareholders.
	The 3st stock acquisition rights Number of the Warrants 387warrants Class and number of the underlying shares, and the method of calculation of those The common stock of the Company 38,700 shares The underlying shares for the Warrants for Subscription shall be the common stock of the Company granted in units of 100 shares per warrant (hereafter referred to as the "Number of Granted Shares"). In the event the Company carries out a stock split, bonus share allotment, or reverse stock split in respect of the common stock of the Company after the allotment date, the Number of Granted Shares shall be adjusted accordingly by the following formula with the resulting fractions of shares omitted. Number of the Granted Shares after adjustment = Number of Granted Shares before adjustment × Ratio of stock split, bonus share allotment or reverse stock split

The Number of Granted Shares after adjustment shall be applied after the date following the record date for the stock split or bonus share allotment in the case of the stock split or bonus share allotment, and in the case of the reverse stock split the date following its effective date. In the event, however, that the stock split or bonus share allotment is carried
out on the condition that the motion to increase capital or a reserve by decreasing the amount of surplus is approved by the general meeting of shareholders of the Company, and a date before the conclusion of the said general meeting is set as the record date for the stock split or bonus share allotment, the Number of Granted Shares after the adjustment shall be applied after the date following the date of the conclusion of the said general meeting of shareholders.

In the event the warrant survives the Company after a corporate merger of either the absorption or consolidation type, or an exchange or transfer of shares which renders the Company a wholly-owned subsidiary, the Number of Granted Shares may be adjusted as deemed necessary according to the ratio of the merger, exchange or transfer. Should the Number of Granted Shares be adjusted, the Company will provide the details by a notice or public announcement to the persons holding the Warrants on record in the stock option registry (hereafter referred to as the "Warrant Holders") on or before the day before the effective date of the adjustment of the Number of Granted Shares. Should the Company be unable to issue the notice or public announcement on or before the day before the said effective date, the Company will make the notice or public announcement without further delay.

The paid-in amount for the warrant, the method of calculation of the warrant or the unnecessariness of the paid-in for the warrant

The amount to be paid in for each Warrant shall be the amount calculated by multiplying a value of the option price (with a fraction less than 1 yen rounded up) per share calculated using the Black-Scholes Model based on the basic figures provided in (2) to (7) below by the Number of the Granted Shares.

$$C = Se^{-qT}N(d) - Xe^{-rT}N\left(d - \sigma\sqrt{T}\right)$$

where

$$d = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

(1) Option price per share (C)

(2) Share price (S): Closing price for the regular trading of the common shares of the Company at the Tokyo Stock Exchange on July 13, 2015 (if no closing price is available, the base price for the next trading day);

(3) Exercise price (X): 1 yen

(4) Estimated residual period (T): 15 years

(5) Volatility (δ): Price volatility calculated from the closing prices for the regular trading of the common shares of the Company on the last trading day of each week during the 15-year period (from July 14, 2000 to July 13, 2015);

(6) Risk-free interest rate (γ): Interest rate of the government bonds the years remaining to maturity of which correspond the estimated residual period;

(7) Dividend yield (q): Dividend per share (a simple average of the actual dividends paid in the most recent two fiscal periods) ÷ share price determined in Item (2) above

(8) Cumulative distribution function (N(*))

* Assumes a setting off of the right to demand remuneration of the allottees against the obligation for payment for the Warrant

	Value of the properties contributed in the exercise of the warrant, or the method of calculation of it The value of the properties contributed in the exercise of each Warrant shall be the amount calculated by multiplying 1 yen per share to be delivered in the exercise of the Warrant for Subscription by the Number of Granted Shares. Exercise period From July 14, 2015 to July 13, 2045 Conditions for the exercise of the warrants (1) The exercise of the Warrant by a Warrant Holder who is no longer in the position of either director or executive officer of the Company is limited to the period of 10 years from one year after the day following the date on which he loses the status. (2) Should a Warrant Holder is appointed as an auditor after his resignation from the position of director or executive officer, the exercise of his Warrant shall be limited to a period of 10 years from one year after the date on which he loses the position of the auditor. (3) In the event of the death of a warrant holder, the Warrant may be exercised by his heir. (4) The Warrant Holder may exercise all or part of his Warrants. Matters and requirements for the acquisition of the warrants In the event in which the Board of Directors of the Company approves (or passes the resolution if a resolution of the general meeting of shareholders is not required) one of the resolutions set out in Paragraphs (1), (2), (3), (4) or (5) below, the Company may acquire the Warrants without compensation on the date separately determined by the Board of Directors. (1) Resolution to approve a merger agreement under which the Company is absorbed; (2) Resolution to approve an agreement for a company split or a plan for an incorporation-type company split by which the Company is split; (3) Resolution to approve a share exchange agreement or a share transfer plan under which the Company becomes a wholly-owned subsidiary; (4) Resolution to approve an amendment to the Articles of Incorporation to provide for the requirement of the approval of the Company in respect of all classes of the shares issued by the Company in the event of the acquisition of such shares by assignment; or (5)Resolution to approve an amendment to the Articles of Incorporation with respect to the underlying shares or classes of shares for the Warrant of which the acquisition by assignment requires the approval of the Company to provide for the requirement for the Company to acquire all shares by a resolution of the General Meeting of Shareholders.
Matters Pertaining establishment of Meeting of the Board of Directors	Establishment of Meeting of the Board of Directors
Matters Pertaining establishment of Corporate Auditors	Establishment of Corporate Auditors
Matters Pertaining establishment of Board of Corporate Auditors	Establishment of Board of Corporate Auditors
Matters Pertaining establishment of Accounting Auditors	Establishment of Accounting Auditors
Matters Pertaining registered record	Head Office transfer from 43-2, Hatagaya 2-Chome, Shibuya-ku, Tokyo on April 1 , 2016 Registered on April 1, 2016

2951 Ishikawa-machi, Hachioji-shi, Tokyo
Olympus Corporation

This document is to certify that the contents described above are all of the matters registered in the commercial registry, which are not closed.

(Tokyo Legal Affairs Bureau Hachioji Branch Jurisdiction)

April 25, 2016

Tokyo Legal Affairs

Registrar Sadahiko Kurosawa (Official seal)

履歴事項全部証明書

東京都八王子市石川町２９５１番地
オリンパス株式会社

会社法人等番号	０１１０－０１－００５２２２
商　号	オリンパス株式会社
本　店	東京都八王子市石川町２９５１番地
公告をする方法	電子公告とする。 ｈｔｔｐ：／／ｗｗｗ．ｏｌｙｍｐｕｓ．ｃｏ．ｊｐ／ｊｐ／ｉｒ／ ただし、事故その他やむを得ない事由によって電子公告による公告をすることができない場合は、日本経済新聞に掲載して行う。
会社成立の年月日	大正８年１０月１２日
目　的	１．顕微鏡、写真機、精密測定器、その他光学機械の製造販売ならびに修理および賃貸業務 ２．医療機器、動物用医療機器、事務用機械、その他一般機械器具の製造販売ならびに修理および賃貸業務 ３．電気機械器具および通信機械器具の製造販売ならびに修理および賃貸業務 ４．医薬品、医薬部外品、化粧品、工業用薬品および化学物質の製造販売 ５．食品および飼料の製造販売 ６．ソフトウェアの開発販売およびコンピュータによる情報処理業務ならびに修理および賃貸業務 ７．通信ネットワークを利用した情報提供サービス ８．前各号に掲げる製品および関連する商品の輸出入 ９．臨床検査および水質分析の受託業務 １０．古物の売買 １１．労働者派遣業 １２．損害保険代理業 １３．旅行代理店業 １４．産業廃棄物処理業および一般廃棄物処理業 １５．不動産の賃貸、売買および仲介 １６．建設工事の設計および施工請負 １７．投資およびコンサルティング業務 １８．前各号に付帯し、または関連する業務
単元株式数	１００株
発行可能株式総数	１０億株

整理番号　ア４８５８７２　　＊　下線のあるものは抹消事項であることを示す。

東京都八王子市石川町２９５１番地
オリンパス株式会社

発行済株式の総数並びに種類及び数	発行済株式の総数 ３億４２６７万１５０８株	
資本の額	金２４５億２０２９万２７８９円	
株主名簿管理人の氏名又は名称及び住所並びに営業所	東京都千代田区丸の内一丁目４番１号 三井住友信託銀行株式会社 東京都千代田区丸の内一丁目４番１号 三井住友信託銀行株式会社　証券代行部	
役員に関する事項	取締役　笹　宏行	平成２７年６月２６日就任
	取締役　竹内康雄	平成２７年６月２６日就任
	取締役　林　繁雄	平成２７年６月２６日就任
	取締役　後藤卓也	平成２７年６月２６日就任
	取締役　姫田史郎	平成２７年６月２６日就任
	取締役　蓮田純孝	平成２７年６月２６日就任
	取締役　西川元啓	平成２７年６月２６日就任
	取締役　鵜瀞恵子	平成２７年６月２６日就任
	取締役　田口晶弘	平成２７年６月２６日就任
	取締役　小川治男	平成２７年６月２６日就任

東京都八王子市石川町２９５１番地
オリンパス株式会社

	東京都新宿区西新宿六丁目１５番１－２１１５号 代表取締役　笹　宏　行	平成２７年６月２６日重任
	東京都渋谷区代々木四丁目５１番２号 代表取締役　笹　宏　行	平成２８年４月１日就任 平成２８年４月２１日重任
	監査役　斎　藤　隆	平成２４年４月２０日重任
	監査役　清　水　昌	平成２４年４月２０日重任
	監査役　名古屋信夫 （社外監査役）	平成２４年４月２０日重任
	監査役　名取勝也 （社外監査役）	平成２４年４月２０日重任
	会計監査人　新日本有限責任監査法人	平成２７年６月２６日重任
当会社の取締役の会社に対する責任の制限に関する事項	当会社は、会社法第４２７条第１項の規定により、社外取締役との間に、任務を怠ったことによる損害賠償責任を限定する契約を締結することができる。ただし、当該契約に基づく責任の限度額は、法令が規定する額とする。	
	当会社は、会社法第４２７条第１項の規定により、社外監査役との間に、任務を怠ったことによる損害賠償責任を限定する契約を締結することができる。ただし、当該契約に基づく責任の限度額は、法令が規定する額とする。	
新株予約権	第１回新株予約権 新株予約権の数 ３０９７個 新株予約権の目的たる株式の種類及び数又はその算定方法 普通株式３万９７００株 募集新株予約権の目的である株式の種類は当社普通株式とし、各募集新株予約権の目的である株式の数（以下、「付与株式数」という。）は１００株とする。 なお、割当日後、当社が、当社普通株式につき、株式分割、株式無償割当てまたは株式併合を行う場合には、次の算式により付与株式数の調整を行い、調整の結果生じる１株未満の端数は、これを切り捨てる。 調整後付与株式数＝調整前付与株式数×株式分割、株式無償割当てまたは株式併合の比率	

東京都八王子市石川町２９５１番地
オリンパス株式会社

調整後付与株式数は、株式分割または株式無償割当ての場合には、当該株式分割または株式無償割当ての基準日の翌日以降、株式併合の場合には、その効力発生日以降、これを適用する。ただし、剰余金の額を減少して資本金または準備金を増加する議案が当社株主総会において承認されることを条件として株式分割または株式無償割当てが行われる場合で、当該株主総会の終結の日以前の日を株式分割または株式無償割当てのための基準日とする場合には、調整後付与株式数は、当該株主総会の終結の日の翌日以降これを適用する。

また、当社が吸収合併もしくは新設合併を行い新株予約権が承継される場合、または当社が完全子会社となる株式交換もしくは株式移転を行い新株予約権が承継される場合には、当社は、合併比率等に応じ、必要と認める付与株式数の調整を行うことができる。付与株式数の調整を行うときは、当社は調整後付与株式数を適用する日の前日までに、必要な事項を新株予約権原簿に記載された各募集新株予約権を保有する者（以下、「新株予約権者」という。）に通知または公告する。ただし、当該適用の日の前日までに通知または公告を行うことができない場合には、以後遅やかに通知または公告する。

募集新株予約権の払込金額若しくはその算定方法又は払込を要しないとする旨

各募集新株予約権の払込金額は、次式のブラック・ショールズモデルにより、以下の（2）から（7）の基礎数値に基づき算出した１株当たりのオプション価格（１円未満の端数は切り上げ）に付与株式数を乗じた金額とする。

$$C = S e^{-rT} N(d) - X e^{-rT} N(d - \sigma\sqrt{T})$$

ここで、

$$d = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{\sigma^2}{2}\right) T}{\sigma\sqrt{T}}$$

（1）１株当たりのオプション価格（C）

（2）株価（S）：平成２５年８月２６日の東京証券取引所における当社普通株式の普通取引の終値（当日に終値がない場合は、直取引日の終値）

（3）行使価格（X）：１円

（4）予想残存期間（T）：１５年

（5）ボラティリティ（σ）：１５年間（平成１０年８月２７日から平成２５年８月２６日まで）の各週の最終取引日における当社普通株式の普通取引の終値に基づき算出した株価変動率

（6）無リスクの利子率（r）：残存年数が予想残存期間に対応する国債の利子率

（7）配当利回り（q）：１株当たりの配当金（直近2期の実績配当金の単純平均値）÷上記（2）に定める株価

（8）標準正規分布の累積分布関数（N（ ））

なお、当該付与を受ける者が当社に対して有する報酬債権と、本新株予約権の払込金額の払込債務とが相殺されるものとする。

新株予約権の行使に際して出資される財産の価額又はその算定方法

各募集新株予約権の行使に際して出資される財産の価額は、当該各募集新株予約権を行使することにより交付を受けることができる株式１株当たりの行使価額１円に付与株式数を乗じた金額とする。

新株予約権を行使することができる期間

平成２５年８月２７日から平成５５年８月２６日

新株予約権の行使の条件

（1）新株予約権者は、当社の取締役および執行役員のいずれの地位をも喪失した日の翌日の１年後から１０年間に限って募集新株予約権を行使

東京都八王子市石川町２９５１番地
オリンパス株式会社

することができる。
（２）新株予約権者が、取締役もしくは執行役員退任後、監査役に就任した場合は、募集新株予約権を行使することができるのは、監査役の地位を喪失した日の翌日の１年後からの１０年間とする。
（３）新株予約権者が死亡した場合は、相続人がこれを行使することができるものとする。
（４）新株予約権者は、募集新株予約権の全部または一部の行使ができるものとする。

会社が新株予約権を取得することができる事由及び取得の条件
以下の（１）、（２）、（３）、（４）または（５）のいずれかの議案につき当社株主総会で承認された場合（株主総会決議が不要の場合は、当社の取締役会決議がなされた場合）は、取締役会が別途定める日に、当社は無償で募集新株予約権を取得することができる。
（１）当社が消滅会社となる合併契約承認の議案
（２）当社が分割会社となる分割契約もしくは新設分割計画承認の議案
（３）当社が完全子会社となる株式交換契約もしくは株式移転計画承認の議案
（４）当社の発行する全部の株式の内容として譲渡による当該株式の取得について当社の承認を要することについての定めを設ける定款の変更承認の議案
（５）募集新株予約権の目的である株式の内容として譲渡による当該株式の取得について当社の承認を要することまたは当該種類の株式について当社が株主総会の決議によってその全部を取得することについての定めを設ける定款の変更承認の議案

第２回新株予約権
新株予約権の数
４１０個
新株予約権の目的たる株式の種類及び数又はその算定方法
普通株式４万１０００株
募集新株予約権の目的である株式の種類は当社普通株式とし、各募集新株予約権の目的である株式の数（以下、「付与株式数」という。）は１００株とする。
なお、割当日後、当社が、当社普通株式につき、株式分割、株式無償割当または株式併合を行う場合には、次の算式により付与株式数の調整を行い、調整の結果生じる１株未満の端数は、これを切り捨てる。
調整後付与株式数＝調整前付与株式数×株式分割、株式無償割当てまたは株式併合の比率
調整後付与株式数は、株式分割または株式無償割当ての場合は、当該株式分割または株式無償割当ての基準日の翌日以降、株式併合の場合は、その効力発生日以降、これを適用する。ただし、剰余金の額を減少して資本金または準備金を増加する議案が当社株主総会において承認されることを条件として株式分割または株式無償割当てが行われる場合で、当該株主総会の終結の日以前の日を株式分割または株式無償割当てのための基準日とする場合は、調整後付与株式数は、当該株主総会の終結の日の翌日以降これを適用する。
また、当社が吸収合併もしくは新設合併を行い新株予約権が承継される場合または当社が完全子会社となる株式交換もしくは株式移転を行い新株予約権が承継される場合には、当社は、合併比率等に応じ必要と認める付与株式数の調整を行うことができる。付与株式数の調整を行うときは、当社は調整後付与株式数を適用する日の前日までに、必要な事項を新株予約権原簿に記載された各募集新株予約権を保有する者（以下、「新株予約権者」という。）

に通知または公告する。ただし、当該通用の日の前日までに通知または公告を行うことができない場合には、以後速やかに通知または公告する。

募集新株予約権の払込金額若しくはその算定方法又は払込を要しないとする旨

各募集新株予約権の払込金額は、次式のブラック・ショールズモデルにより以下の（２）から（７）の基礎数値に基づき算出した1株当たりのオプション価格（１円未満の端数は切り上げ）に付与株式数を乗じた金額とする。

$$C = S e^{-qT} N(d) - X e^{-rT} N(d - \sigma\sqrt{T})$$

ここで、

$$d = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{\sigma^2}{2}\right) T}{\sigma\sqrt{T}}$$

（１）１株当たりのオプション価格（C）

（２）株価（S）：平成２６年７月１１日の東京証券取引所における当社普通株式の普通取引の終値（当日に終値がない場合は、翌取引日の基準値段）

（３）行使価格（X）：１円

（４）予想残存期間（T）：１５年

（５）ボラティリティ（σ）：１５年間（平成１１年７月１２日から平成２６年７月１１日まで）の各週の最終取引日における当社普通株式の普通取引の終値に基づき算出した株価変動率

（６）無リスクの利子率（r）：残存年数が予想残存期間に対応する国債の利子率

（７）配当利回り（q）：１株当たりの配当金（直近２期の実績配当金の単純平均値）÷上記（２）に定める株価

（８）標準正規分布の累積分布関数（N（・））

※割当てを受ける者が当社に対して有する報酬請求権と、本新株予約権の払込金額の払込債務とが相殺されるものとする。

新株予約権の行使に際して出資される財産の価額又はその算定方法

各募集新株予約権の行使に際して出資される財産の価額は、当該各募集新株予約権を行使することにより交付を受けることができる株式1株当たりの行使価額1円に付与株式数を乗じた金額とする。

新株予約権を行使することができる期間

平成２６年７月１２日から平成５６年７月１１日

新株予約権の行使の条件

（１）新株予約権者は、当社の取締役および執行役員のいずれの地位をも喪失した日の翌日の１年後から１０年間に限って募集新株予約権を行使することができる。

（２）新株予約権者が、取締役もしくは執行役員退任後、監査役に就任した場合は、募集新株予約権を行使することができるのは、監査役の地位を喪失した日の翌日の１年後からの１０年間とする。

（３）新株予約権者が死亡した場合は、相続人がこれを行使することができるものとする。

（４）新株予約権者は、募集新株予約権の全部または一部の行使ができるものとする。

会社が新株予約権を取得することができる事由及び取得の条件

以下の（１）、（２）、（３）、（４）または（５）のいずれかの議案につき当社株主総会で承認された場合（株主総会決議が不要の場合は、当社の取締役会決議がなされた場合）は、取締役会が別途定める日に、当社は無償で募集新株予約権を取得することができる。

東京都八王子市石川町２９５１番地
オリンパス株式会社

（１）当社が消滅会社となる合併契約承認の議案
（２）当社が分割会社となる分割契約もしくは新設分割計画承認の議案
（３）当社が完全子会社となる株式交換契約もしくは株式移転計画承認の議案
（４）当社の発行する全部の株式の内容として譲渡による当該株式の取得について当社の承認を要することについての定めを設ける定款の変更承認の議案
（５）募集新株予約権の目的である株式の内容として譲渡による当該株式の取得について当社の承認を要することまたは当該種類の株式について当社が株主総会の決議によってその全部を取得することについての定めを設ける定款の変更承認の議案

第３回新株予約権

新株予約権の数

３８７個

新株予約権の目的たる株式の種類及び数又はその算定方法

普通株式３万８７００株

募集新株予約権の目的である株式の種類は当社普通株式とし、各募集新株予約権の目的である株式の数（以下、「付与株式数」という。）は１００株とする。

なお、割当日後、当社が、当社普通株式につき、株式分割（当社普通株式を無償割当てする場合を含む。）または株式併合を行う場合には、次の算式により付与株式数の調整を行い、調整の結果生じる１株未満の端数は、これを切り捨てる。

調整後付与株式数＝調整前付与株式数×株式分割（株式無償割当てまたは株式併合の比率

調整後付与株式数は、株式分割または株式無償割当ての場合は、当該株式分割または株式無償割当ての基準日の翌日以降、株式併合の場合は、その効力発生日以降、これを適用する。ただし、剰余金の額を減少して資本金または準備金を増加する議案が当社株主総会において承認されることを条件とし株式分割または株式無償割当てが行われる場合で、当該株主総会の終結の日以前の日を株式分割または株式無償割当てのための基準日とする場合は、調整後付与株式数は、当該株主総会の終結の日の翌日以降これを適用する。

また、当社が吸収合併もしくは新設合併を行い新株予約権が承継とされる場合または当社が完全子会社となる株式交換もしくは株式移転を行い新株予約権が承継される場合には、当社は、合併比率等に応じ、必要と認める付与株式数の調整を行うことができる。付与株式数の調整を行うときは、当社は調整後付与株式数を適用する日の前日までに、必要な事項を新株予約権原簿に記載された各募集新株予約権を保有する者（以下、「新株予約権者」という。）に通知または公告する。ただし、当該適用の日の前日までに通知または公告を行うことができない場合には、以後速やかに通知または公告する。

募集新株予約権の払込金額若しくはその算定方法又は払込を要しないこととする旨

各募集新株予約権の払込金額は、次式のブラック・ショールズモデルにより、以下の（２）から（７）の基礎数値に基づき算出した、株１株当たりのオプション価格（１円未満の端数は切り上げ）に付与株式数を乗じた金額とする。

$$C = S e^{-\sigma} N(d) - X e^{-\sigma} N(d - \sigma\sqrt{T})$$

ここで、

$$d = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{\sigma^2}{2}\right) T}{\sigma\sqrt{T}}$$

（１）１株当たりのオプション価格（C）
（２）株価（S）：平成２７年７月１３日の東京証券取引所における当社普通株式の普通取引の終値（当日に終値がない場合は、直近取引日の基準値段）
（３）行使価格（X）：１円
（４）予想残存期間（T）：１５年
（５）ボラティリティ（σ）：１５年間（平成１２年７月１４日から平成２７年７月１３日まで）の各週の最終取引日における当社普通株式の普通取引の終値に基づき算出した株価変動率
（６）無リスクの利子率（r）：残存年数が予想残存期間に対応する国債の利子率
（７）配当利回り（q）：１株当たりの配当金（直近２期の実績配当金の単純平均値）÷上記（２）に定める株価
（８）標準正規分布の累積分布関数（N（・））
※割当てを受ける者が当社に対して有する報酬請求権と、本新株予約権の払込金額の払込債務とが相殺されるものとする。

新株予約権の行使に際して出資される財産の価額又はその算定方法
各募集新株予約権の行使に際して出資される財産の価額は、当該各募集新株予約権を行使することにより交付を受けることができる株式１株当たりの行使価額１円に付与株式数を乗じた金額とする。

新株予約権を行使することができる期間
平成２７年７月１４日から平成５７年７月１３日

新株予約権の行使の条件
（１）新株予約権者は、当社の取締役および執行役員のいずれの地位をも喪失した日の翌日の１年後から１０年間に限って募集新株予約権を行使することができる。
（２）新株予約権者が、取締役もしくは執行役員退任後、監査役に就任した場合は、募集新株予約権を行使することができるのは、監査役の地位を喪失した日の翌日の１年後からの１０年間とする。
（３）新株予約権者が死亡した場合は、相続人がこれを行使することができるものとする。
（４）新株予約権者は、募集新株予約権の全部または一部の行使ができるものとする。

会社が新株予約権を取得することができる事由及び取得の条件
以下の（１）、（２）、（３）、（４）または（５）のいずれかの議案につき当社株主総会で承認された場合（株主総会決議が不要の場合は、当社の取締役会決議がなされた場合）は、取締役会が別途定める日に、当社は無償で募集新株予約権を取得することができる。
（１）当社が消滅会社となる合併契約承認の議案
（２）当社が分割会社となる分割契約もしくは新設分割計画承認の議案
（３）当社が完全子会社となる株式交換契約もしくは株式移転計画承認の議案
（４）当社の発行する全部の株式の内容として譲渡による当該株式の取得について当社の承認を要することについての定めを設ける定款の変更承認の議案
（５）募集新株予約権の目的である株式の内容として譲渡による当該株式の取得について当社の承認を要することまたは当該種類の株式について当社が株主総会の決議によってその全部を取得することについての定めを設ける定款の変更承認の議案

東京都八王子市石川町２９５１番地
オリンパス株式会社

取締役会設置会社に関する事項	取締役会設置会社
監査役設置会社に関する事項	監査役設置会社
監査役会設置会社に関する事項	監査役会設置会社
会計監査人設置会社に関する事項	会計監査人設置会社
登記記録に関する事項	平成２８年４月１日東京都渋谷区幡ヶ谷二丁目４３番２号から本店移転 平成２８年　４月　１日登記

これは登記簿に記録されている閉鎖されていない事項の全部であることを証明した書面である。
（東京法務局八王子支局管轄）
平成２８年　４月２５日
東京法務局
登記官　黒　澤　貞　彦

整理番号　ア４８５８７２　　＊　下線のあるものは抹消事項であることを示す。　　9／9

OB

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 25944

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

OLYMPUS CORPORATION

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Mitsugu Sakai		
Title	General Manager of Intellectual Property Planning Department in Intellectual Property & Licensing Division of Olympus Corporation		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

Electronic Acknowledgement Receipt

EFS ID:	27896612
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Cyndi Racine
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	23-DEC-2016
Filing Date:	24-JAN-2014
Time Stamp:	16:54:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	Req_to_update_PALM_20161223.pdf	107316 39b4640d015168e04e0f53c52a8149f7d412258c	no	2

Warnings:

Information:					
2	Application Data Sheet	ADS20161223.pdf	11505617 138a7a497eb8939adc95130bd2479a01d822c085	no	27
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
			Total Files Size (in bytes):	11612933	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/163,528	01/24/2014	Hideo SANAI	153190

CONFIRMATION NO. 1030

IMPROPER CFR REQUEST

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

Date Mailed: 12/06/2016

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Power of Attorney, Claims, Fees, System Limitations, and Miscellaneous

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The ADS submitted on __12/01/2016__ attempts to change the applicant but cannot be entered. Any request to change the applicant once the applicant has been specified must include (1) an application data sheet specifying the new applicant in the Applicant Information section, and (2) a statement under 37 CFR 3.73(c) (USPTO Form PTO/AIA/96 or an equivalent) to show chain of title to the new applicant. The application data sheet must contain markings to show the information that is being changed, with underlining for additions and strike-through or brackets for deletions. See 37 CFR 1.76(c)(2).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ggasgedom/

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014

For: SURGICAL DEVICE

Attn: OIPE

Group Art Unit: 3739

Docket No.: 153190

REQUEST FOR CORRECTION OF PALM RECORDS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attached is a photocopy of the updated Application Data Sheet on which errors have been corrected. These errors are being brought to the attention of the Patent and Trademark Office so that it may correct its records.

Respectfully submitted,

/Bryan K. Hsu/

James A. Oliff
Registration No. 27,075

Bryan K. Hsu
Registration No. 72,762

JAO:BKH/cfr

Attachment:
Updated Application Data Sheet

Date: December 1, 2016

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UPDATED

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hideo		SANAI	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hachioji-shi	Country of Residence	JP

Mailing Address of Inventor:

Address 1	~~c/o OLYMPUS I.P. SERVICES CO., LTD.~~ OLYMPUS CORPORATION		
Address 2	~~I.P. Support Dept., 2-3 Kuboyama-cho~~ 2951 Ishikawa-machi		
City	Hachioji-shi, Tokyo	**State/Province**	
Postal Code	~~192-8512~~ 192-8507	**Country**	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	25944		
Email Address	email@oliff.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURGICAL DEVICE		
Attorney Docket Number	153190	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	25944		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		[redacted]
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	PCT/JP2013/060447	2013-04-05
Prior Application Status	Expired		[redacted]
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/JP2013/060447	non provisional of	61/636,269	2012-04-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee ○ Legal Representative under 35 U.S.C. 117 ○ Joint Inventor

○ Person to whom the inventor is obligated to assign. ○ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	~~OLYMPUS MEDICAL SYSTEMS CORP.~~ OLYMPUS CORPORATION		
Mailing Address Information For Applicant:			
Address 1	~~43-2, Hatagaya 2-chome, Shibuya-ku~~ 2951 Ishikawa-machi		
Address 2			
City	~~Tokyo~~ Hachioji-shi, Tokyo	**State/Province**	
Country	JP	Postal Code	192-8507
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

If the Assignee is an Organization check here. ☒

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UPDATED

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Organization Name			
Mailing Address Information For Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature				Date (YYYY-MM-DD)	2016-12-01
First Name	Bryan	Last Name	Hsu	Registration Number	72762

Additional Signature may be generated within this form by selecting the Add button.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Co o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	27667945
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Cyndi Racine
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	01-DEC-2016
Filing Date:	24-JAN-2014
Time Stamp:	15:59:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Corrected Filing Receipt	Req_PALM_Corr.pdf	102613 0546929f9c5f3d2b1ff95e54fc39ce92d2f7afa0	no	1

Warnings:

Information:					
2	Application Data Sheet	Updated_ADS.pdf	425845 a0f007729cf3c4f6725cc58d8e3e5cd086bbaccd	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
			Total Files Size (in bytes):	528458	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

25944 7590 10/25/2016

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER
DELLA, JAYMI E

ART UNIT	PAPER NUMBER
3739	

DATE MAILED: 10/25/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

TITLE OF INVENTION: SURGICAL DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	01/25/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

25944 7590 10/25/2016
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

TITLE OF INVENTION: SURGICAL DEVICE

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nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	01/25/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
DELLA, JAYMI E	3739	606-045000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

25944 7590 10/25/2016

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
DELLA, JAYMI E	

ART UNIT	PAPER NUMBER
3739	

DATE MAILED: 10/25/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/163,528	Applicant(s) SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendment submitted 10/6/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-5*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JAYMI DELLA/
Primary Examiner, Art Unit 3739

NOTICE OF ALLOWANCE

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

2. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

Response to Amendment

3. Acknowledgment is made to the amendment received 10/6/2016.

4. Applicant's amendments to the claims are sufficient to overcome the claim objections set forth in the previous office action.

Examiner's Amendment

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ee Ming Yap on October 11, 2016.

The application has been amended as follows:

1) **Amend claim 1 as follows:** amend "an impedance detection section configured to detect an impedance between two pinching members that are configured to pinch the living tissue in between two pinching members that are configured to pinch the living tissue in the treatment section" to - an impedance detection section configured to detect an impedance between two pinching members of the treatment section that are configured to pinch the living tissue- in ll. 23-25.

Reasons for Allowance

6. The following is an examiner's statement of reasons for allowance: As for claim 1, the prior art of record, taken alone or in combination, fails to disclose or render obvious "A surgical apparatus comprising: a treatment section for treating a living tissue; an energy generation section for providing high-frequency current to the treatment section; a liquid feeding conduit for feeding a liquid to the living tissue; a suction conduit for suctioning the liquid; an energy control section configured to output a high-frequency output control signal for controlling the high-frequency current from the energy generation section; a first pump drive section configured for feeding the liquid from the liquid feeding conduit while the high-frequency current is output in response to a command for an output of the high-frequency output control signal from the energy control section, and configured to stop the feeding of the liquid from the liquid feeding conduit when the first pump drive section receives a command for stopping the high-

frequency output control signal, wherein the first pump drive section causes the feeding of the liquid from the liquid feeding conduit to terminate simultaneously with stopping the high-frequency output control signal; a second pump drive section configured to cause the suction conduit to suction the liquid for a predetermined period of time or in a predetermined amount, only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and configured to stop the suction of the liquid form the suction conduit after suctioning for the predetermined period of time or in the predetermined amount; and an impedance detection section configured to detect an impedance between two pinching members of the treatment section that are configured to pinch the living tissue, wherein the predetermined period of time or the predetermined amount is configured to vary according to the impedance detected by the impedance detection section."

7. The closest prior art is regarded as **Utley et al. (2006/0259029, previously cited), Christopherson et al. (2004/0215181) and Mulier et al. (2006/0015097, previously cited).** Utely et al. disclose a treatment section, energy generation section, liquid feeding conduit, suction conduit, energy control section, first pump drive section for feeding liquid and a second pump drive section for activating suctioning. Utely et al. fail to disclose the first pump drive section to cause the feeding of liquid to terminate simultaneously with stopping an output of a high-frequency output control signal and the second pump drive section configured to cause suctioning of fluid only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, the suctioning occurring for a

predetermined period of time or a predetermined amount. However, Christopherson et al. disclose a pump drive section to cause the feeding of liquid to terminate simultaneously as stopping an output of a high-frequency output control signal and Mulier et al. disclose a pump drive section configured to cause suctioning of fluid only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section. Utley, Christopherson and Mulier fail to disclose "the predetermined period of time or the predetermined amount...configured to vary according to [an] impedance detected by [an] impedance detection section".

8. **Claims 1-5 are allowed.**

9. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAYMI DELLA whose telephone number is (571)270-1429. The examiner can normally be reached on M-Th 8:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Joseph Stoklosa can be reached on (571)272-1213. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAYMI DELLA/
Primary Examiner, Art Unit 3739

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	51	((suction$4 or vacuum$4 or aspirat$4) and (liquid or fluid or irrigant or irrigation or irrigating) and (high$frequency or radio$frequency or rf or hf) and (pump$4) and (stop$4 or terminat$4 or discontinu$4)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/10/11 12:18
S1	56	sanai-hideo$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S2	8620	(olympus and medical and systems).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S3	304	hatta-shinji$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S4	8	(S1 or S3) and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S5	15	(S1 or S3) and (pump or pumping or pumped) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S6	7	S5 not S4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S7	277	S2 and (pump or pumping or pumped)	US-PGPUB;	OR	OFF	2015/04/07

		and (liquid or fluid or irrigation or irrigating or irrigant or saline)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			20:36
S8	193	S2 and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:36
S9	9	(("20100137751") or ("20030040672") or ("20100324458") or ("20060265035") or ("6666860") or ("20100185196") or ("20030040672") or ("20100324458") or ("6306131") or ("20010032002") or ("20070156134")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/07 20:46
S10	290	a61b18/0206.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S11	1374	a61c1/07.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S12	3466	a61f9/00745.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S13	294	a61f2013/15869.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S14	1868	a61h23/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54
S15	190	a61h39/007.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2015/04/07 20:54

			IBM_TDB			
S16	1667	a61m11/005.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:55
S18	63	a61m2205/3693.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:56
S19	0	"14163528."	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S20	1	"14163528"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S21	24996	((A61B17/320092 OR A61B18/14 OR A61B18/1445 OR A61B2218/002 OR A61B2218/007).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S22	2	"14163203"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S23	30022	((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/002).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
S24	4949	(S21 or S23) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
S25	4535	(S21 or S23) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/04/07 20:58

		or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	EPO; JPO; DERWENT; IBM_TDB			
S26	527895	(pump or pumping or pumped) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38
S28	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38
S29	827287	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (output or current or voltage or power or energy)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S30	881068	(pump or pumping or pumped) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S31	283150	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S32	487127	(time or duration or amount or volume or level) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:40
S34	605	S26 and S28 and S29 and S30 and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:40
S35	235	S26 and S28 and S30 and (S31 same S29)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 09:15
S36	56	(S28 and (S26 same S32) and (S29 same S31) and (S26 same S30))	US-PGPUB; USPAT;	OR	OFF	2015/04/08 09:32

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S37	26	"9814131"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 10:25
S38	30	(fluid$assisted and electrocautery and device).ti.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 10:26
S39	0	("2006265035").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 10:27
S40	1	("20060265035").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 10:27
S41	4	"11433982"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 11:24
S42	1	(11/433982).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 11:24
S44	33304	(a61b18/1442 or a61b18/1445 or a61b18/1447 or a61b2018/1442 or a61b2018/145 or s61b2018/1452 or a61b2018/1455 or a61b2018/1457 or a61b2018/146 or a61b2018/1462 or a61b17/28 or a61b17/2812 or a61b17/2816 or a61b17/282 or a61b17/285 or a61b17/29 or a61b17/2909 or a61b17/30 or a61b2017/1125 or or a61b2017/22031 or a61b2017/22034 or a61b2017/22035 or a61b2017/28 or or a61b2017/2812 or or a61b2017/282 or or a61b2017/29 or or a61b2017/2926 or a61b2017/30 or a61b10/06).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 11:31
S45	134	S44 and S26 and S28 and S30	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 11:32
S46	437017	(controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/04/08 14:22

		pumping or pumped or liquid or fluid or irrigation or irrigating or irrigant or saline or suction or suctioning or suctioned or vacuum or vacum or aspirate or aspirated or aspirating or aspiration)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S47	33304	(a61b18/1442 or a61b18/1445 or a61b18/1447 or a61b2018/1442 or a61b2018/145 or s61b2018/1452 or a61b2018/1455 or a61b2018/1457 or a61b2018/146 or a61b2018/1462 or a61b17/28 or a61b17/2812 or a61b17/2816 or a61b17/282 or a61b17/285 or a61b17/29 or a61b17/2909 or a61b17/30 or a61b2017/1125 or or a61b2017/22031 or a61b2017/22034 or a61b2017/22035 or a61b2017/28 or or a61b2017/2812 or or a61b2017/282 or or a61b2017/29 or or a61b2017/2926 or a61b2017/30 or a61b10/06).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S48	242	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S49	527895	(pump or pumping or pumped) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S50	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S51	881068	(pump or pumping or pumped) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S53	30	S46 and S47 and S49 and S50 and S51	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:24
S54	1	("20050033278").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:06
S55	1	("5417709").PN.	US-PGPUB;	OR	OFF	2015/04/08

			USPAT; USOCR			15:10
S56	213	("2397823" | "3019790" | "3980086" | "4646751" | "4750488" | "4763668" | "4880015" | "5016614" | "5123902" | "5131379" | "5141519" | "5152778" | "5195958" | "5197968" | "5209747" | "5217460" | "5224931" | "5286255" | "5300087" | "5312391").PN. OR ("5417709").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:13
S58	113	S56 and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 15:15
S59	9	S56 and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline) and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 15:17
S60	1	("20050010212").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:23
S61	1	(10/206842).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:26
S62	275280	((stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) near3 (energy or current or voltage or power)) with ((commence or commenced or commencing or start or started or starting or begin or beginning or begun or activate or activation or activating or activated) near3 (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)(output or current or voltage or power or energy))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:02
S63	611	S47 and S62 and S50	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:03
S65	20	S47 and S62 and S50 and S51 and S49	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:03
S66	4478	((liquid or fluid or irrigate or irrigation	US-PGPUB;	OR	OFF	2015/04/08

		or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			16:27
S67	278197	("128" or "606" or "607").clas.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S68	552	S66 and S67	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S69	43	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28

		stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)).clm.				
S70	9	S67 and S69	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S71	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:36
S72	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:37

		or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and (controller or micro$controller or processor or micro$processor or cpu or control$unit)				
S73	12	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:39
S74	1	("20080167645").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 16:41

S75	44	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49
S76	697	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49

		(radio$frequency or rf or high$frequency or hf or electrosurgical)) and S67 and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))				
S77	3	(("8523850") or ("8523851") or ("8523852")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 17:18
S78	1	("20100042101").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 10:22
S79	0	("2009015705").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:05
S80	1	("20090157075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:05
S81	1	("6306131").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:11
S82	113	(high$frequency or radio$frequency) with microwave with ultrasonic$4 with cryogen$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:40
S83	5145	(606/32-38).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:40
S84	15	S82 and S83	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:40
S85	10028	(high$frequency or radio$frequency) with ultrasonic$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:47
S86	192	S83 and S85	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:47
S87	35	S83 and S85 and (forcep or jaw)	US-PGPUB; USPAT;	OR	OFF	2015/08/06 11:49

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S88	1	("20070225697").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 12:21
S89	14755	(606/32-52).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 08:52
S90	1407946	aspiration or aspirating or aspirated or aspirate or suction or suctioned or suctioning	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 08:52
S92	3738	S89 and S90	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 08:53
S93	5945753	stop or stopped or stopping or halt or halted or halting or terminate or terminating or termination or terminated or stoppage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 08:54
S94	261	(S90 with S93) and S89	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 08:54
S95	2232	S93 with (energy or power or voltage or current or frequency or wave$form) with S90	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 09:14
S96	34	S89 and S95	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 09:14
S97	1	("20060259029").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 09:50
S98	1	("20060265035").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 10:30
S99	1	("20110040299").PN.	US-PGPUB;	OR	OFF	2015/08/07

			USPAT; USOCR			11:30
S100	1	("20060015097").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 11:44
S101	1	("20100042101").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/11/23 08:42
S102	2	(("20100042101") or ("20090157075")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/11/23 08:58
S103	30775	parameter with impedance	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2015/11/23 09:01
S104	1	S102 and S103	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2015/11/23 09:01
S105	3	(("6666860") or ("20020058933") or ("20080167645")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/11/23 09:20
S106	1907	((liquid or irrigation or irrigant or irrigating or fluid or saline) and impedance and (control or controller or controlling or control$unit or processor or microprocessor or microcontroller) and (time or amount or duration)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:07
S107	7711	a61b2018/00875.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:08
S108	4543	a61b2018/00642.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:08
S109	1346	a61b2018/00744.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:08
S110	2039	a61b2018/00761.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:08
S111	7151	a61b2018/00702.cpc.	US-PGPUB;	OR	OFF	2016/01/05

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			07:08
S112	13289	S107 or S108 or S109 or S110 or S111	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:08
S113	124	S106 and S112	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:08
S114	707	(((liquid or irrigation or irrigant or irrigating or fluid or saline) with (time or amount or duration)) and impedance and (control or controller or controlling or control$unit or processor or microprocessor or microcontroller)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:14
S115	3	(("20100042101") or ("20090157075") or ("6306131")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/01/05 07:15
S116	37	S114 and S112	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:22
S117	5	(((liquid or irrigation or irrigant or irrigating or fluid or saline) with impedance) same ((control or controller or controlling or control$unit or processor or microprocessor or microcontroller) with (liquid or irrigation or irrigant or irrigating or fluid or saline)) same ((liquid or irrigation or irrigant or irrigating or fluid or saline) with impedance with (large or larger or great or greater or increas$4) with amount)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:31
S118	14	(((liquid or irrigation or irrigant or irrigating or fluid or saline) same impedance) same ((large or larger or great or greater or increas$4) with amount)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 07:41
S119	12	(impedance same (large or larger or great or greater or increas$4) with (rate near4 (liquid or irrigation or irrigant or irrigating or fluid or saline))).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2016/01/05 08:35

			DERWENT; IBM_TDB			
S120	280	(impedance same (large or larger or great or greater or increas$4) with (rate near4 (liquid or irrigation or irrigant or irrigating or fluid or saline)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 08:39
S121	112	(impedance with (large or larger or great or greater or increas$4) with (rate near4 (liquid or irrigation or irrigant or irrigating or fluid or saline)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 08:57
S122	121	(impedance with (large or larger or great or greater or increas$4) with (rate near4 (liquid or irrigation or irrigant or irrigating or fluid or saline or infuse or infusing or infusion)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 09:08
S123	9	(impedance with (large or larger or great or greater or increas$4) with (rate near4 (infuse or infusing or infusion)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 09:08
S124	14	S109 and (rate same (impedance with (increas$4 or greater or bigger or larger or large)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 09:11
S125	374	a61b2018/00744.cpc. and rate	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 09:41
S126	70	a61b2018/00744.cpc. and (rate with impedance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/01/05 09:54
S127	3	((10/986687) or (12/315423)).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/01/05 10:00
S128	1	("20060009758").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/01/05 10:01
S129	1346	a61b2018/00744.cpc.	US-PGPUB; USPAT; USOCR;	OR	OFF	2016/01/05 10:19

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S130	1	(14/163203).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/09/28 13:51
S131	4	(("20100042101") or ("20090157075") or ("20100042101") or ("6306131") or ("20070225697")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/09/28 13:55
S132	5652	(stop or stopped or stoppage or stopping or terminate or terminating or termination or terminated or halt or halted or halting or discontinue or discontinued or discontinuing) with (Energy or power or voltage or generator or current) with (time or duration) with rate	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:10
S133	466	(stop or stopped or stoppage or stopping or terminate or terminating or termination or terminated or halt or halted or halting or discontinue or discontinued or discontinuing) with (Energy or power or voltage or generator or current) with (amount or volume) with impedance	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:10
S135	6097	S132 or S133	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:16
S136	47628	a61b18$.cpc. or a61b2018$.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:16
S137	153	S135 and S136	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:16
S138	361	(stop or stopped or stoppage or stopping or terminate or terminating or termination or terminated or halt or halted or halting or discontinue or discontinued or discontinuing) with (Energy or power or voltage or generator or current) with (time or duration) with rate with (liquid or fluid or irrigant or irrigating or irrigation or saline or coolant)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:18
S139	16	(stop or stopped or stoppage or stopping or terminate or terminating or termination or terminated or halt or halted or halting or discontinue or discontinued or discontinuing) with (Energy or power or voltage or generator or current) with (amount or volume) with impedance with (liquid or fluid or irrigant or irrigating or irrigation or saline or coolant)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/28 14:18

S141	1	("20050075701").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/09/28 15:38
S142	1	("6235022").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/09/28 16:05
S143	1	("20050118383").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/09/28 17:45

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	12	((suction$4 or vacuum$4 or aspirat$4) and (liquid or fluid or irrigant or irrigation or irrigating) and (high$frequency or radio$frequency or rf or hf) and (pump$4) and (stop$4 or terminat$4 or discontinu$4)).clm.	USPAT	OR	OFF	2016/10/11 12:23

10/ 11/ 2016 12:58:44 PM
C:\ Users\ jdella\ Documents\ EAST\ Workspaces\ 14163203 & 14163528.wsp

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
14163528	SANAI, HIDEO
Examiner	**Art Unit**
JAYMI DELLA	3739

CPC								
Symbol							**Type**	**Version**
A61B		18	/	14			F	2013-01-01
A61B		17	/	320092			I	2013-01-01
A61B		18	/	1445			I	2013-01-01
A61B		2218	/	002			A	2013-01-01
A61B		2218	/	007			A	2013-01-01
A61B		2017	/	00026			A	2013-01-01
A61B		2018	/	00875			A	2013-01-01
			/					
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CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
			/							
			/							

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	5	
/JAYMI DELLA/ Primary Examiner.Art Unit 3739	10/11/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14163528	SANAI, HIDEO
	Examiner	**Art Unit**
	JAYMI DELLA	3739

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
28		A	6	1	B	18 / 14 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	5	
/JAYMI DELLA/ Primary Examiner.Art Unit 3739	10/11/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14163528	SANAI, HIDEO
	Examiner	**Art Unit**
	JAYMI DELLA	3739

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
2	2														
3	3														
4	4														
5	5														
-	6														
-	7														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 5	
/JAYMI DELLA/ Primary Examiner.Art Unit 3739 (Primary Examiner)	10/11/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14163528	SANAI, HIDEO
	Examiner	Art Unit
	JAYMI DELLA	3739

CPC- SEARCHED		
Symbol	Date	Examiner
((A61B17/320092 OR A61B18/14 OR A61B18/1445 OR A61B2218/002 OR A61B2218/007).CPC.)	2015/04/07	JD
((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/0	2015/04/07	JD

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see EAST search history	2015/04/29	JD
updated EAST search	2015/08/07	JD
updated EAST search	2016/04/20 & 26	JD
updated EAST search	2016/10/11	JD

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	see intererence search printout	2016/10/11	JD

	/JAYMI DELLA/ Primary Examiner.Art Unit 3739

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Group Art Unit: 3739

Application No.: 14/163,528

Examiner: J. DELLA

Filed: January 24, 2014

Docket No.: 153190

For: SURGICAL DEVICE

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In reply to the July 7, 2016 Office Action, please consider the following:

Amendments to the Claims as reflected in the listing of claims; and

Remarks.

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A surgical apparatus comprising:

a treatment section for treating a living tissue;

an energy generation section for providing high-frequency current to the treatment section;

a liquid feeding conduit for feeding a liquid to the living tissue;

a suction conduit for suctioning the liquid;

an energy control section configured to output a high-frequency output control signal for controlling the high-frequency current from the energy generation section;

a first pump drive section configured ~~to feed~~for feeding the liquid from the liquid feeding conduit while the high-frequency current is ~~output, in~~output in response to a command for an output of the high-frequency output control signal from the energy control section, and configured to stop the feeding of the liquid from the liquid feeding ~~conduit, when~~conduit when the first pump drive section receives a command for stopping the high-frequency output control signal, wherein the first pump drive section causes the feeding of the liquid from the liquid feeding conduit to terminate ~~at the same time as a stoppage of the output of the high-frequency current; and~~simultaneously with stopping the high-frequency output control signal;

a second pump drive section configured to cause the suction conduit to suction the liquid for a predetermined period of time or in a predetermined amount, only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and configured to stop the suction of the liquid

from the suction conduit after suctioning for the predetermined period of time or in the predetermined ~~amount.~~amount; and

an impedance detection section configured to detect an impedance between two pinching members that are configured to pinch the living tissue in between two pinching members that are configured to pinch the living tissue in the treatment section,

wherein the predetermined period of time or the predetermined amount is configured to vary according to the impedance detected by the impedance detection section.

2. (Previously Presented) The surgical apparatus according to claim 1, wherein

the predetermined period of time or the predetermined amount is stored in a storage section and can be set or changed.

3. (Previously Presented) The surgical apparatus according to claim 1, wherein

the predetermined period of time or the predetermined amount is set according to a period of time of outputting the high-frequency current or a period of time of driving the first pump drive section.

4. (Currently Amended) The surgical apparatus according to claim 1, wherein

upon receipt of an instruction for generating the high-frequency current to the energy generation section after ~~stoppage of~~stopping the high-frequency ~~current,~~output control signal, the energy control section is configured to stop the second pump drive section suctioning the liquid from the liquid feeding conduit.

5. (Currently Amended) The surgical apparatus according to claim 1, further comprising

a pump configured to connect with the suction conduit, wherein the energy control section is configured to perform control so that driving of the pump is started so as to

perform the suction of the liquid via the ~~pump,~~pump in response to after stopping ~~of the high-frequency current of~~ the high-frequency output control signal, and the pump is stopped after suctioning the liquid via the pump for the predetermined period of time or in the predetermined amount.

6-7. (Canceled)

REMARKS

Claims 1-5 are pending in this application. By this Amendment, claims 1 and 5 are amended. No new matter is added.

I. Allowable Subject Matter

Applicant thanks the Examiner for the indication that claim 7 contains allowable subject matter. Claim 1 is amended to include the allowable features of claim 7. Thus, Applicant submits that this application is in condition for allowance.

II. Claim Objections

The Office Action objects to claims 1, 4, 5 and 7 for having informalities. The claims are amended responsive to the objection. Withdrawal of the objection is respectfully requested.

III. 35 U.S.C. §103 Rejection

The Office Action rejects claims 1 and 3-5 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2006/0259029 (Utley) in view of U.S. Patent Application Publication No. 2004/0215181 (Christopherson) and further in view of U.S. Patent Application Publication No. 2006/015097 (Mulier); and claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Utely in view of Christopherson and Mulier and further in view of U.S. Patent Application Publication No. 2011/0040299 (Kim). These rejections are respectfully moot.

Claim 1 is amended to include the allowable features of claim 7. Thus, claim 1 is in condition for allowance. Claims 2-5 are dependent claims and thus are also in condition for allowance.

Withdrawal of the rejections is respectfully requested.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

/Ee Ming T. Yap/
James A. Oliff
Registration No. 27,075

Ee Ming T. Yap
Registration No. 65,347

JAO:ETY/ixp

Date: October 6, 2016

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

Electronic Acknowledgement Receipt

EFS ID:	27141468
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/In Park
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	06-OCT-2016
Filing Date:	24-JAN-2014
Time Stamp:	14:07:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20161005_Amendment.pdf	29214 bbf9a09df0ec11aa8f07e18b3fc60ac7b357e8de	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	6
Warnings:			
Information:			
	Total Files Size (in bytes):	29214	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	To be Mailed
14/163,528	01/24/2014	☐

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **10/06/2016**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 6	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/VICTOR BARLOW/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

25944 7590 07/07/2016

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
DELLA, JAYMI E	

ART UNIT	PAPER NUMBER
3739	

NOTIFICATION DATE	DELIVERY MODE
07/07/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
jarmstrong@oliff.com

Office Action Summary	Application No. 14/163,528	Applicant(s) SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/6/2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5 and 7* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5* is/are rejected.

8)☒ Claim(s) *7* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. The following is a Non-Final Office Action on the merits.

Notice of Pre-AIA or AIA Status

2. The present application is being examined under the pre-AIA first to invent provisions.

3. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

Continued Examination Under 37 CFR 1.114

4. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/6/2015 has been entered.

Response to Amendment

5. Acknowledgment is made to the amendment received 10/6/2015.

6. Applicant's amendments to the claims are sufficient to overcome the claim objections set forth in the previous office action.

Information Disclosure Statement

7. The information disclosure statement filed 2/17/2016 fails to comply with 37 CFR 1.98(a)(3)(i) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each reference listed that is not in the English language. It has been placed in the application file, but the information with the strike-through therein has not been considered.

Claim Objections

8. **Claim 1** is objected to because of the following informalities: amend "to feed" to -for feeding- in ll. 9. Appropriate correction is required.

9. **Claim 1** is objected to because of the following informalities: amend "output, in" to –output in- in ll. 10. Appropriate correction is required.

10. **Claim 1** is objected to because of the following informalities: amend "to stop feeding" to –to stop the feeding- in ll. 11-12. Appropriate correction is required.

11. **Claim 1** is objected to because of the following informalities: amend "conduit, when" to –conduit when- in ll. 12. Appropriate correction is required.

12. **Claim 1** is objected to because of the following informalities: amend "to terminate at the same time as a stoppage of the output of the high-frequency current" to

–to terminate simultaneously with stopping the high-frequency output control signal- in ll. 14-15. Appropriate correction is required.

13. **Claim 4** is objected to because of the following informalities: amend “after stoppage of the high-frequency current” to –after stopping the high-frequency output control signal- in ll. 3. Appropriate correction is required.

14. **Claim 5** is objected to because of the following informalities: amend “pump, in" to -pump in- in ll. 5. Appropriate correction is required.

15. **Claim 5** is objected to because of the following informalities: amend “stopping of the high-frequency current of the high-frequency output control signal” to - after stopping the high-frequency output control signal- in ll. 5-6. Appropriate correction is required.

16. **Claim 7** is objected to because of the following informalities: amend “varies” to – is configured to vary- in ll. 5. Appropriate correction is required.

Claim Rejections - 35 USC § 103

17. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

18. Claims 1 & 3-5 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Utley et al. (2006/0259029, previously cited) in view of Christopherson et al. (2004/0215181) and Mulier et al. (2006/0015097, previously cited).

19. Concerning **claim 1**, as illustrated in Fig. 82, Utley et al. disclose **a surgical apparatus** (system 24; [0120]) **comprising:**

a treatment section for treating a living tissue (operative element 36; [0125]);

an energy generation section for providing high-frequency current to the treatment section (generator 38 supplies radiofrequency treatment energy; [0130]);

a liquid feeding conduit for feeding a liquid to the living tissue (fluid delivery apparatus 44 conveys processing fluid F through the lumen 98 for discharge at the treatment site; [0179]);

a suction conduit for suctioning the liquid (aspirating apparatus 46 conveys aspirated material from or near from the operative element 36 through lumen 102 for discharge; [0133], [0180]);

an energy control section configured to output a high-frequency output control signal for controlling the high-frequency current from the energy generation section (controller 52 governs the power levels, cycles, and duration of radio frequency energy as well as delivery of processing fluid, and if desired, the removal of aspirated material; [0135]);

a first pump drive section that configured to feed the liquid from the liquid feeding conduit while the high-frequency current is output (fluid delivery apparatus 44 comprises an integrated pump 428 that is coupled to the I/O device 54; [0394-0395), **in response to a command for an output of the high- frequency output control signal from the energy control section, and configured to stop feeding of the liquid from the liquid feeding conduit, when the first pump drive section receives a command for stopping the high- frequency output control signal** (when the foot pedal 416 is pressed, the controller 52 activates the pump rotor 428 and cooling liquid is

conveyed through the treatment device TD into contact with mucosal tissue at the targeted site and after a preliminary time period, the controller 52 applies rf energy through the electrodes, and controller 52 terminates the conveyance of rf ablation energy and commands a flow of cooling liquid for a predetermined time after the energy is stopped; [0437-0438], [0451-0452])**; and**

a second pump drive section configured to cause the suction conduit to suction the liquid (an additional dedicated pump rotor or equivalent pumping mechanism to perform the aspiration function; [0399]) **for a predetermined period of time or in a predetermined amount, after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and configured to stop suction of the liquid from the suction conduit after suctioning for the predetermined period of time or in the predetermined amount** (controller 52 terminates the conveyance of rf ablation energy and commands aspiration from the treatment device for a predetermined time after the energy is stopped in conjunction with the flow of cooling liquid; [0451-0452])**.**

Utely et al. fail to disclose the first pump drive section causing the feeding of the liquid from the liquid feeding conduit to terminate at the same time, or simultaneously, as stopping the high-frequency output control signal. However, Christopherson et al. disclose a surgical apparatus (10) comprising a treatment section (21), an energy generation section (30) a liquid feeding conduit (24), an energy control section (controller) configured output a high-frequency output control signal for controlling the high-frequency current from the energy generation section (30) and a first pump drive

section (pump). Christopherson et al. further disclose the first pump drive section configured to feed the liquid from the liquid feeding conduit (24) while the high-frequency current is output in response to a command for an output of the high-frequency output control signal from the energy control section (controller) and configured to stop feeding the liquid from the liquid feeding conduit when the first pump drive section (pump) is configured for stopping the high-frequency output control signal. Christopherson et al. further discloses the first pump drive section (pump) causes the feeding of the liquid from the liquid feeding conduit to terminate either simultaneously or for a period of time after termination of ablation energy. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the invention such that the first pump drive section causes the feeding of the liquid from the liquid feeding conduit to terminate either simultaneously as termination of ablation energy since Christopherson et al. teaches terminating the liquid feeding simultaneously or for a time period to be equivalents in the art ([0044], [0064], [0061], [0063])

Utely et al. fail to disclose the second pump drive section configured to cause suctioning only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control suction. However, Mulier et al. disclose a surgical apparatus (20) comprising an energy generation section (22) where suctioning is provided either during or subsequent to termination of the application of RF power to tissue. It would have been an obvious matter of design choice to one having ordinary skill in the art at the time the invention was made to suction only after receiving a command for stopping energy delivery since Mulier et al.

teaches suctioning during energy delivery and after termination of energy delivery to be equivalents in the art. ([0044]

20. Concerning **claim 3**, Utely et al. disclose the predetermined time to be set according to the period of time for driving the first pump (428) ([0451-0452]).

21. Concerning **claim 4**, Utely et al. disclose that the energy control section (52) stops the second pump after receiving the instruction to stop the output of energy ([0451-0452]; Fig. 82).

22. Concerning **claim 5**, Utely et al. disclose controlling the driving of the second suction pump to start when the high frequency energy is stopped, and stopping the second pump after the liquid has been supplied for the predetermined period of time ([0452]).

23. Claim 2 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Utely (2006/0259029, previously cited) Christopherson et al. (2004/0215181) and Mulier et al. (2006/0015097, previously cited), as applied to claim 1, in view of Kim et al. (2011/0040299, previously cited).

24. Concerning **claim 2**, Utely et al. disclose the predetermined period of time to be stored in a storage section of generator (52) ([0134], [0437]). While Utely et al. disclose an I/O device (54) to input control and processing variables ([0136]), Utely et al. fail to specifically disclose the predetermined period of time configured to be set or changed. However, Kim et al. disclose a surgical apparatus comprising a front panel (2305) of an energy control section (2301) that includes display and time set elements for various

parameters of the surgical apparatus ([0034]). At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the invention of Utely in such that the predetermined period can be set or changed in order to provide the benefit of user control on the input time parameters as taught by Kim et al. ([0034]; Fig. 1)

Allowable Subject Matter

25. **Claim 7** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

26. The following is a statement of reasons for the indication of allowable subject matter: the prior art, neither alone nor in combination discloses “the predetermined period of time or the predetermined amount varies according to the impedance detected by the impedance detection section".

Response to Arguments

27. Applicant’s arguments are moot in view of the new ground(s) of rejection.

Conclusion

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: **Inagaki et al. (2010/0042101).**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAYMI DELLA whose telephone number is (571)270-1429. The examiner can normally be reached on M-Th 8:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Stoklosa can be reached on (571)272-1213. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAYMI DELLA/
Primary Examiner, Art Unit 3739

Notice of References Cited	Application/Control No. 14/163,528	Applicant(s)/Patent Under Reexamination SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2004/0215181 A1	10-2004	Christopherson, Mark A.	A61B18/1477	606/32
*	B	US-2010/0042101 A1	02-2010	Inagaki; Genri	A61B18/1442	606/52
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14163528	SANAI, HIDEO
	Examiner	Art Unit
	JAYMI DELLA	3739

CPC- SEARCHED

Symbol	Date	Examiner
((A61B17/320092 OR A61B18/14 OR A61B18/1445 OR A61B2218/002 OR A61B2218/007).CPC.)	2015/04/07	JD
((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/0	2015/04/07	JD

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
see EAST search history	2015/04/29	JD
updated EAST search	2015/08/07	JD
updated EAST search	2016/04/20 & 26	JD

INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/JAYMI DELLA/ Primary Examiner.Art Unit 3739

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8920415		2014-12-30	Govari	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060258975	A1	2006-11-16	Takahashi	

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FOREIGN PATENT DOCUMENTS Remove

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	1	102138823	CN	A	2011-08-03	Biosense Webster Israel Ltd		X

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.E.D/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

	1	December 23, 2015 Office Action issued in Chinese Patent Application No. 201380010521.9.	X

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EXAMINER SIGNATURE

Examiner Signature	/JAYMI E DELLA/	Date Considered	04/20/2016

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.E.D/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/B. Graham Nelson/	Date (YYYY-MM-DD)	2016-02-17
Name/Print	B. Graham Nelson	Registration Number	72699

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.E.D/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.E.D/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	644	(suction$4 or vacuum$4 or vacum$4 or aspirat$4) with (time or duration or amount) with impedance	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:46
L5	45010	a61b18$.cpc. or a61b2018$.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:46
L6	32	4 and L5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:46
L8	878	((suction$4 or vacuum$4 or vacum$4 or aspirat$4) with (time or duration or amount)) same ((time or duration or amount) with impedance)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:47
L9	33	L5 and L8	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:47
L10	0	6 not L9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:47
L11	9500	(suction$4 or vacuum$4 or vacum$4 or aspirat$4) same (time or duration or amount) same impedance	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:48
L12	174	5 and 11	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:48
L13	141	12 not 9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:48
L14	77	((suction$4 or vacuum$4 or vacum$4 or aspirat$4) same (time or duration or amount) same impedance).clm.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/26 18:57

S1	56	sanai-hideo$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S2	8620	(olympus and medical and systems).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S3	304	hatta-shinji$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S4	8	(S1 or S3) and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S5	15	(S1 or S3) and (pump or pumping or pumped) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S6	7	S5 not S4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S7	277	S2 and (pump or pumping or pumped) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:36
S8	193	S2 and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:36
S9	9	(("20100137751") or ("20030040672") or ("20100324458") or ("20060265035") or ("6666860") or ("20100185196") or ("20030040672") or ("20100324458") or ("6306131")	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/07 20:46

		or ("20010032002") or ("20070156134")).PN.				
S10	290	a61b18/0206.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S11	1374	a61c1/07.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S12	3466	a61f9/00745.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S13	294	a61f2013/15869.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S14	1868	a61h23/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54
S15	190	a61h39/007.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54
S16	1667	a61m11/005.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:55
S18	63	a61m2205/3693.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:56
S19	0	"14163528."	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/04/07 20:57

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S20	1	"14163528"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S21	24996	((A61B17/320092 OR A61B18/14 OR A61B18/1445 OR A61B2218/002 OR A61B2218/007).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S22	2	"14163203"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S23	30022	((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/002).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
S24	4949	(S21 or S23) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
S25	4535	(S21 or S23) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
S26	527895	(pump or pumping or pumped) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38
S28	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38

S29	827287	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (output or current or voltage or power or energy)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S30	881068	(pump or pumping or pumped) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S31	283150	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S32	487127	(time or duration or amount or volume or level) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:40
S34	605	S26 and S28 and S29 and S30 and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:40
S35	235	S26 and S28 and S30 and (S31 same S29)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 09:15
S36	56	(S28 and (S26 same S32) and (S29 same S31) and (S26 same S30))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 09:32
S37	26	"9814131"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 10:25
S38	30	(fluid$assisted and electrocautery and device).ti.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2015/04/08 10:26

			DERWENT; IBM_TDB			
S39	0	("2006265035").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 10:27
S40	1	("20060265035").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 10:27
S41	4	"11433982"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 11:24
S42	1	(11/433982).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 11:24
S44	33304	(a61b18/1442 or a61b18/1445 or a61b18/1447 or a61b2018/1442 or a61b2018/145 or s61b2018/1452 or a61b2018/1455 or a61b2018/1457 or a61b2018/146 or a61b2018/1462 or a61b17/28 or a61b17/2812 or a61b17/2816 or a61b17/282 or a61b17/285 or a61b17/29 or a61b17/2909 or a61b17/30 or a61b2017/1125 or or a61b2017/22031 or a61b2017/22034 or a61b2017/22035 or a61b2017/28 or or a61b2017/2812 or or a61b2017/282 or or a61b2017/29 or or a61b2017/2926 or a61b2017/30 or a61b10/06).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 11:31
S45	134	S44 and S26 and S28 and S30	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 11:32
S46	437017	(controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigation or irrigating or irrigant or saline or suction or suctioning or suctioned or vacuum or vacum or aspirate or aspirated or aspirating or aspiration)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:22
S47	33304	(a61b18/1442 or a61b18/1445 or a61b18/1447 or a61b2018/1442 or a61b2018/145 or s61b2018/1452 or a61b2018/1455 or a61b2018/1457 or a61b2018/146 or a61b2018/1462 or a61b17/28 or a61b17/2812 or a61b17/2816 or a61b17/282 or a61b17/285 or a61b17/29 or a61b17/2909 or a61b17/30 or a61b2017/1125 or or a61b2017/22031 or a61b2017/22034	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23

		or a61b2017/22035 or a61b2017/28 or or a61b2017/2812 or or a61b2017/282 or or a61b2017/29 or or a61b2017/2926 or a61b2017/30 or a61b10/06).cpc.				
S48	242	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S49	527895	(pump or pumping or pumped) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S50	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S51	881068	(pump or pumping or pumped) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
S53	30	S46 and S47 and S49 and S50 and S51	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:24
S54	1	("20050033278").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:06
S55	1	("5417709").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:10
S56	213	("2397823" | "3019790" | "3980086" | "4646751" | "4750488" | "4763668" | "4880015" | "5016614" | "5123902" | "5131379" | "5141519" | "5152778" | "5195958" | "5197968" | "5209747" | "5217460" | "5224931" | "5286255" | "5300087" | "5312391").PN. OR ("5417709").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:13
S58	113	S56 and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 15:15

S59	9	S56 and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline) and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 15:17
S60	1	("20050010212").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:23
S61	1	(10/206842).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:26
S62	275280	((stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) near3 (energy or current or voltage or power)) with ((commence or commenced or commencing or start or started or starting or begin or beginning or begun or activate or activation or activating or activated) near3 (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) (output or current or voltage or power or energy))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:02
S63	611	S47 and S62 and S50	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:03
S65	20	S47 and S62 and S50 and S51 and S49	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:03
S66	4478	((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:27

		stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)				
S67	278197	("128" or "606" or "607").clas.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S68	552	S66 and S67	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S69	43	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S70	9	S67 and S69	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2015/04/08 16:28

			IBM_TDB			
S71	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:36
S72	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and (controller or micro$controller or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:37

		processor or micro$processor or cpu or control$unit)				
S73	12	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:39
S74	1	("20080167645").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 16:41
S75	44	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49

		de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))				
S76	697	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and S67 and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49
S77	3	(("8523850") or ("8523851") or ("8523852")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 17:18
S78	1	("20060259029").PN.	US-PGPUB; USPAT;	OR	OFF	2015/04/29 07:22

			USOCR			
S79	2231	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 09:25
S80	33909	(time or duration or minute or second) with (set or pre$set or input) with (suction or suctioned or suctioning or aspirate or aspirated or aspiration or aspirating or vacuum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 10:29
S81	18834	606/32-52.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 10:29
S82	60	S80 and S81	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 10:29

S83	1505	(time or duration or minute or second or amount or volume) with impedance with (suction or suctioned or suctioning or aspirate or aspirated or aspiration or aspirating or vacuum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:22
S84	29	S81 and S83	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:22
S85	85847	a61b18$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S86	76075	a61b2018$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S87	97114	S85 or S86	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S88	36	S83 and S87	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S89	108	((time or duration or minute or second or amount or volume) with impedance with (suction or suctioned or suctioning or aspirate or aspirated or aspiration or aspirating or vacuum)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:42
S90	5	(("20100137751") or ("20030040672") or ("20100324458") or ("20060265035") or ("6666860")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/29 12:51
S91	75	malecki.in. and suction$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 14:11
S92	2	(10/952492).APP.	US-PGPUB;	OR	OFF	2015/04/29

			USPAT; USOCR			14:12
S93	5	(("5417709") or ("20100137751") or ("20110040299") or ("20060265035") or ("20060259029")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/29 14:15
S94	164	della adj jaymi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 14:21
S95	2	(("20060259029") or ("20060015097")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/20 15:58
S99	324180	(liquid or irrigant or irrigation or irrigating or fluid) near4 (off or stop$5 or terminat$4 or discontinu$5 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 16:58
S100	1411586	(output or energy or energiz$4 or current or voltage or power or generator) near4 (off or stop$5 or terminat$4 or discontinu$5 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 16:58
S101	11625	S99 with S100	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 16:59
S102	44934	a61b18$.cpc. or a61b2018$.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 16:59
S103	175	S101 and S102	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 16:59
S104	17	(US-20030040672-$ or US-20060259029-$ or US-20060265035-$ or US-20110306968-$ or US-20110306967-$ or US-20050033278-$ or US-20050010212-$ or US-20040024396-$ or US-20080167645-$ or US-20060074410-$ or US-20040215181-$ or US-20140058294-$).did. or (US-6063081-$ or US-6056735-$ or US-5417709-$ or US-7338434-$ or US-6045549-$).did.	US-PGPUB; USPAT	OR	ON	2016/04/20 18:12
S105	3	S103 and S104	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 18:12
S106	4	(("5836909") or ("5279547") or ("5797901") or ("20080167645")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/20 18:14
S107	6	(("5836909") or ("5279547") or	US-PGPUB;	OR	OFF	2016/04/20

		("5797901") or ("20080167645") or ("8920415") or ("20060258975")).PN.	USPAT; USOCR			18:15
S108	3	(("5836909") or ("20080167645") or ("5279547")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/20 18:15
S109	3	(("20060259029") or ("20040215181") or ("20060015097")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/20 18:38
S110	1374	sanai.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 18:52
S111	38	sanai.in. and olympus.as.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 18:52
S112	8	sanai.in. and olympus.as.	US-PGPUB	OR	ON	2016/04/20 18:52
S113	1	("20100042101").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/20 18:59
S114	86	(suction$4 or vacuum$4 or vacum$4 or aspirat$4) with (time or duration or amount) with (pre$set or pre$determin$4 or set$point) with impedance	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 19:05
S115	0	S102 and S114	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 19:05
S116	877	((suction$4 or vacuum$4 or vacum$4 or aspirat$4) with (time or duration or amount)) same ((time or duration or amount) with impedance)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 19:06
S117	33	S102 and S116	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/04/20 19:06

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L15	39	((suction$4 or vacuum$4 or vacum$4 or aspirat$4) same (time or duration or amount) same impedance).clm.	USPAT	OR	ON	2016/04/26 18:57

4/ 26/ 2016 6:58:33 PM
C:\ Users\ jdella\ Documents\ EAST\ Workspaces\ 14163528.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8920415		2014-12-30	Govari	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060258975	A1	2006-11-16	Takahashi	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	102138823	CN	A	2011-08-03	Biosense Webster Israel Ltd		X

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Attorney Docket Number	153190

~~1~~	~~December 23, 2015 Office Action issued in Chinese Patent Application No. 201380010521.9~~		X

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Examiner Signature	/JAYMI E DELLA/	Date Considered	04/20/2016

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Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/B. Graham Nelson/	Date (YYYY-MM-DD)	2016-02-17
Name/Print	B. Graham Nelson	Registration Number	72699

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
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First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5836909	A	1998-11-17	Cosmescu	
	2	5279547	A	1994-01-18	Costin	
	3	5797901	A	1998-08-25	Cosmescu	

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	1	20080167645	A1	2008-07-10	Woloszko	

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	1	September 14, 2015 Extended European Search Report issued in European Patent Application No. 13779010.1.	☐

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Examiner Signature	/JAYMI E DELLA/	Date Considered	04/20/2016

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 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.E.D/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Examiner Name	J. E. Della
	Attorney Docket Number	153190

	1	December 23, 2015 Office Action issued in Chinese Patent Application No. 201380010521.9.	X

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

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Signature	/B. Graham Nelson/	Date (YYYY-MM-DD)	2016-02-17
Name/Print	B. Graham Nelson	Registration Number	72699

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Hideo SANAI	Attorney Docket No.: 153190
Application No.: 14/163,528	Confirmation No.: 1030
Filed: January 24, 2014	Art Unit: 3739
For: SURGICAL DEVICE	Examiner: J. E. Della

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 CFR §1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO/SB/08 Form. Unless otherwise indicated herein, one copy of each item(s) is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

☒ 1. This Information Disclosure Statement is being filed before the mailing date of a first Office Action on the merits after the filing of a Request for Continued Examination under 37 CFR §1.114. No certification or fee is required.

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Respectfully submitted,

Electronic signature: / B. Graham Nelson /
James A. Oliff
Registration No.: 27,075
B. Graham Nelson
Registration No.: 72,699

JAO:BGN/est

Date: February 17, 2016

OLIFF PLC
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Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

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A61B 18/12(2006.01)

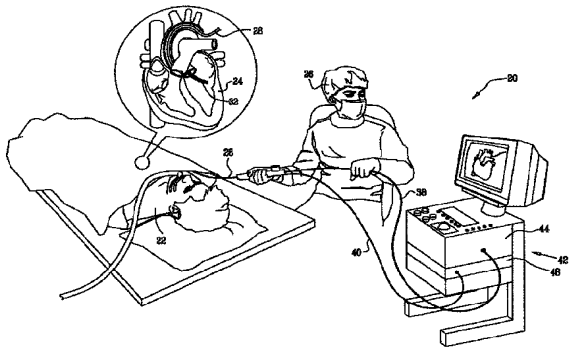
权利要求书 2 页 说明书 4 页 附图 5 页

(54)发明名称

带螺旋电极的导管

(57)摘要

本发明提供了一种侵入式探针，所述侵入式探针包括插入管，所述插入管包括中央腔和远端部分，所述中央腔用于提供冲洗流体，而所述远端部分具有多个穿过其中的穿孔，所述穿孔在所述插入管的所述中央腔和外表面之间提供流体连通。所述插入管的所述远端部分上装配有至少一个螺旋电极。



CN 102138823 A

1. 一种侵入式探针，包括：

插入管，所述插入管包括中央腔和远端部分，所述中央腔用于提供冲洗流体，而所述远端部分具有多个穿过其中的穿孔，所述穿孔在所述插入管的所述中央腔和外表面之间提供流体连通；以及

至少一个螺旋电极，装配在所述插入管的所述远端部分上。

2. 根据权利要求 1 所述的探针，还包括穿过所述管并电连接到所述至少一个螺旋电极的一根或多根线材。

3. 根据权利要求 1 所述的探针，其中所述至少一个螺旋电极覆盖一些所述穿孔。

4. 根据权利要求 1 所述的探针，其中所述至少一个螺旋电极包括多个螺旋电极，所述多个螺旋电极沿所述远端部分分布。

5. 根据权利要求 1 所述的探针，其中所述插入管被构造为用于穿过血管插入受试者的心室，从而让所述至少一个螺旋电极接触所述心脏内的心内膜组织。

6. 根据权利要求 1 所述的探针，其中所述多个穿孔包括至少 8 个穿孔。

7. 根据权利要求 6 所述的探针，其中所述多个穿孔包括至少 50 个穿孔。

8. 根据权利要求 1 所述的探针，其中所述穿孔的直径小于 0.5mm。

9. 根据权利要求 8 所述的探针，其中所述穿孔的直径小于 0.2mm。

10. 根据权利要求 1 所述的探针，其中所述穿孔具有根据所述穿孔相应纵向位置而变化的相应尺寸。

11. 根据权利要求 1 所述的探针，其中所述至少一个螺旋电极包括螺旋缠绕在所述插入管的所述远端部分周围的线圈。

12. 根据权利要求 1 所述的探针，其中所述至少一个螺旋电极包括沿螺旋图案切割的管。

13. 医疗设备，包括：

探针，用于插入受试者体内，所述探针包括：

插入管，所述插入管包括中央腔和远端部分，所述远端部分具有多个穿过其中的穿孔，所述穿孔在所述插入管的所述中央腔和外表面之间提供流体连通；以及

至少一个螺旋电极，装配在所述插入管的所述远端部分上，并且被构造为接触所述身体内的组织；

能量产生器，用于连接到所述探针，以向所述至少一个螺旋电极提供电能；以及

冲洗泵，用于连接到所述中央腔，以经所述中央腔和所述穿孔向所述组织供应冲洗流体。

14. 根据权利要求 13 所述的设备，其中所述能量产生器被连接以向所述至少一个螺旋电极供应电能，以消融所述组织。

15. 根据权利要求 13 所述的设备，其中所述探针被构造为用于穿过血管插入所述受试者的心脏，以消融所述心脏内的心肌组织。

16. 一种处理方法，包括：

将探针插入受试者体内，所述探针包括：

插入管，所述插入管包括中央腔和远端部分，所述远端部分具有多个穿过其中的穿孔，所述穿孔在所述插入管的所述中央腔和外表面之间提供流体连通；以及

至少一个螺旋电极，装配在所述插入管的所述远端部分上；

将所述至少一个螺旋电极与所述身体内的组织接触；

通过所述至少一个螺旋电极向所述组织施加电能；以及

通过所述中央腔和所述穿孔向所述组织供应冲洗流体。

17. 根据权利要求 16 所述的方法，其中插入所述探针包括将所述探针经血管穿入所述受试者的心脏，并且其中施加所述电能包括消融所述心脏内的心肌组织。

18. 根据权利要求 16 所述的方法，其中供应所述流体包括冷却所述远端部分和所述组织。

19. 一种用于制备医疗装置的方法，包括：

穿过包括中央腔的插入管的远端部分的外表面形成多个穿孔，从而在所述插入管的所述中央腔和外表面之间提供流体连通；

在所述插入管的所述远端部分上滑动包含导电材料的至少一个螺旋电极；以及

将所述至少一个螺旋电极固定到所述插入管的所述远端部分的所述外表面上。

20. 根据权利要求 19 所述的方法，还包括将一根或多根线材穿过所述管，并将所述线材电连接到所述至少一个螺旋电极上。

21. 根据权利要求 19 所述的方法，其中所述至少一个螺旋电极覆盖一些所述穿孔。

22. 根据权利要求 19 所述的方法，其中滑动所述至少一个螺旋电极包括沿所述远端部分定位多个螺旋电极。

带螺旋电极的导管

技术领域

[0001] 本发明整体涉及医疗装置，具体地讲，涉及冷却侵入式探针在身体内所接触的组织的方法。

背景技术

[0002] 在一些医疗程序中，将能量以浓缩剂量局部地施加到身体组织，并且希望将处理区域冷却以减少附带的组织损伤。

[0003] 例如，使用心脏消融疗法来治疗心律失常，方法为通过用射频 (RF) 电能加热组织以在心肌内产生不导电的损伤。已经发现的是，冷却消融位点区域会减少组织焦化和血栓形成。出于此目的，Biosense Webster Inc. (Diamond Bar, California) 提供了作为其集成式消融系统一部分的ThermoCool®冲洗顶端导管。该金属导管顶端以 RF 电流供能来消融组织，并且具有若干个用于冲洗处理位点的周边孔，这些孔环绕该顶端周边分布。连接到导管的泵将盐水溶液输送到导管顶端，并且该溶液在所述过程中经周边孔流出，从而冷却导管顶端和组织。

发明内容

[0004] 下文描述的本发明的实施例提供了用于创伤性医疗手术的冲洗探针（例如用于 RF 消融的冲洗导管），以及制备此类探针的有效方法。

[0005] 因此根据本发明的实施例提供了侵入式探针，该探针包括插入管和远端部分，其中插入管包括用于提供冲洗流体的中央腔，而远端部分具有多个穿过其中的穿孔，这些穿孔在插入管的中央腔和外表面之间提供流体连通。插入管的远端部分上装配有至少一个螺旋电极。

[0006] 通常，探针包括穿过插入管并电连接到上述至少一个螺旋电极的一根或多根线材。除此之外或作为另外一种选择，该至少一个螺旋电极覆盖一些穿孔。

[0007] 在一个实施例中，该至少一个螺旋电极包括多个螺旋电极，这些电极沿远端部分分布。

[0008] 在本发明所公开的实施例中，插入管被构造为用于穿过血管插入受试者的心室，从而让该至少一个螺旋电极接触心脏内的心内膜组织。

[0009] 通常，多个穿孔包括至少八个穿孔，并可能包括至少五十个穿孔。穿孔通常具有小于 0.5mm、并可能小于 0.2mm 的直径。穿孔可具有根据其相应纵向位置而变化的相应尺寸。

[0010] 在一个实施例中，该至少一个螺旋电极包括螺旋缠绕在插入管远端部分周围的线圈。在另一个实施例中，该至少一个螺旋电极包括沿螺旋图案切割的管。

[0011] 根据本发明的实施例还提供了包括用于插入受试者体内的探针的医疗设备。该探针包括插入管和远端部分，其中插入管包括中央腔，而远端部分具有多个穿过其中的穿孔，这些穿孔在插入管的中央腔和外表面之间提供流体连通；同时，插入管远端部分上装配有至少一个螺旋电极，并配置为接触体内组织。能量产生器连接到探针，以向上述至少一个螺

旋电极提供电能。冲洗泵连接到中央腔，用来经中央腔和穿孔向组织供应冲洗流体。

[0012] 在本发明所公开的实施例中，连接的能量产生器用于向该至少一个螺旋电极供电，以消融组织。例如，探针可以被构造为用于穿过血管插入受试者的心脏，以消融心脏内的心肌组织。

[0013] 此外，根据本发明的实施例提供了处理方法（包括将探针插入受试者体内）。该探针包括插入管和远端部分，其中插入管包括中央腔，而远端部分具有多个穿过其中的穿孔，这些穿孔在插入管的中央腔和外表面之间提供流体连通；同时，插入管远端部分上装配有至少一个螺旋电极。该至少一个螺旋电极与体内的组织接触。电能通过该至少一个螺旋电极施加到组织，而冲洗流体经中央腔和穿孔供应到组织。

[0014] 通常，供应冲洗流体是为了冷却远端部分和组织。

[0015] 根据本发明的实施例还提供了制造医疗装置的方法，该方法包括穿过包括中央腔的插入管的远端部分的外表面生成多个穿孔，从而在插入管的中央腔和外表面之间提供流体连通。包含导电材料的至少一个螺旋电极在插入管远端部分上滑动。然后将该至少一个螺旋电极固定到插入管远端部分的外表面上。

[0016] 通过以下结合附图的实施例的详细说明，将更全面地理解本发明：

附图说明

[0017] 图 1 为根据本发明实施例的用于心脏消融疗法的系统的示意性说明图；

[0018] 图 2 为根据本发明实施例的穿孔导管插入管的示意性侧视图；

[0019] 图 3 为根据本发明实施例的线圈电极的示意性侧视图；

[0020] 图 4 为根据本发明实施例的装配有线圈电极的穿孔导管的远端部分的示意性侧视图；

[0021] 图 5 为图 4 的导管沿 V-V 线截取的示意性剖视图；以及

[0022] 图 6 为根据本发明实施例的装配有线圈电极的环状标测导管的示意性侧视图。

具体实施方式

[0023] 在上述 RF 电消融手术中，冲洗消融位点区域可减少组织焦化、血栓形成，以及消融电极和组织之间的粘合。到目前为止，用于冲洗的方法和装置需要将电极本身穿孔，以使得冲洗流体可经穿孔由导管进入处理区域。此类穿孔电极和制备穿孔的方法在（例如）2008 年 7 月 15 提交的美国专利申请 12/173,150 中有所描述，该专利申请转让给本专利申请的受让人，并且其公开内容以引用方式并入本文中。然而，制备穿孔既浪费时间，成本也太高，并且可能削弱电极结构。

[0024] 下文描述的本发明的实施例提供了制备具冲洗功能的环形电极的简便而经济的方法。侵入式探针（例如导管）在其外壁上即将设置环形电极的区域内具有多个穿透外壁的穿孔。这些穿孔与探针内用于将冲洗流体传输到穿孔的中央腔连通。导电性线圈电极（该电极通常具有螺旋弹簧的形状和回弹性）在电极目标位置处装配并固定到探针。该线圈电极连接到穿过探针的一根或多根线材上，这些线材可用于（例如）向线圈提供用于消融疗法的 RF 电能。虽然设置的线圈电极通常会覆盖探针壁内一些穿孔，但位于线圈匝之间的间隙内的其他穿孔不会被线圈电极覆盖。操作过程中，从这些开放的穿孔中流出的冲洗

流体可冲洗到整个处理区域。

[0025] 上文所述和随后的附图所示出的设计既方便制造，又成本低廉。该设计不仅具备穿孔冲洗电极可实现的有益效果，还避免了在电极中形成穿孔将会遇到的困难和高昂的成本。这种电极结构可用于沿导管或其他结构（例如套索结构）的长度形成多个环形电极。

[0026] 图 1 为根据本发明实施例的用于心脏消融疗法的系统 20 的示意性说明图。操作员 26 将导管 28 穿过血管插入受试者 22 的心脏 24 的腔室内，操纵该导管以使导管的远端部分 32 接触心内膜待处理的区域。在导管的远端部分穿孔，以允许冲洗处理区域，如下文所示和所述。然而，在其他方面，系统 20 类似于本领域中已知的用于心脏消融处理的系统（例如上述 Biosense Webster 系统），并且此类系统的组件可适用于系统 20。

[0027] 在将导管 28 的远端部分 32 定位于消融位点、并确保远端部分的电极（如下所示）接触该位点的心内膜之后，操作员 26 启动控制台 42 内的射频 (RF) 能量产生器 44，以通过电缆 38 向电极供应 RF 能。同时，冲洗泵 48 通过管 40 和导管 28 内的中央腔向远端部分供应冷却流体（例如盐水溶液）。可调节 RF 能量产生器和冲洗泵的操作，以在消融过程中提供适当体积的冲洗流体来冷却电极和组织，而不会向心脏加入过多的冲洗流体。远端部分 32 中的温度传感器（图中未示出）可以向控制台 42 提供反馈信息用于控制 RF 能量剂量和 / 或冲洗流体体积。

[0028] 图 2 为根据本发明实施例的导管 28 的插入管 50 的一部分的示意性侧视图。图中示出了在将电极组装到远端部分 32 上之前的制造阶段的插入管远端部分。管 50 通常包含合适的生物相容性塑料（例如聚氨酯），并通常具有约 2.3mm 的直径和约 0.15mm 的壁厚。然而，这些尺寸仅以举例方式给出，根据应用要求可使用更大或更小的尺寸。

[0029] 管 50 远端部分的外表面被多个穿孔 52 穿透，这些穿孔纵向（即沿与导管 28 的纵向轴线平行的方向）和环向（沿围绕轴的周长的方向）分布在远侧顶端的表面上。可通过本领域已知的任何合适方法在管 50 内形成穿孔，例如，在制造管时预先模制穿孔，或者在挤出管之后通过冲孔或钻孔方式（使用激光器或机械装置）在管内形成穿孔。

[0030] 远端部分 32 包括内部贮存器 56，该贮存器由管 50 内的中央腔 58 供应冲洗流体。穿孔 52 在贮存器 56 和管 50 的外表面之间延伸。在附图所示实施例中，贮存器 56 具有内表面 54，内表面可通过（例如）在管 50 内装配直径较小的管形成。作为另外一种选择，贮存器可占据管 50 远侧顶端处的整个内部空间，然后再由邻近远侧顶端的塞子（未示出）封堵，并连通中央腔 58。可供选择的贮存器构型对于本领域的技术人员将显而易见，并将被视为在本发明的范围内。

[0031] 通常，管 50 具有至少 8 个穿孔，穿孔直径小于 0.5mm，这样的结构可在远端部分 32 的整个区域上同时纵向和环向分配冲洗流体，而不会使流向心脏的冷却流体过量。然而，发明人已发现有利的是在远端部分内具有至少 50 个穿孔，并且穿孔直径不大于 0.2mm、并可能小至约 0.1mm。穿孔尺寸可任选地在远侧顶端的整个长度上变化，以补偿压力变化，并确保在整个长度上的流量相等。出于此目的，与更靠近冲洗流体入口的较近侧的穿孔相比，可将顶端最远侧部分和其附近的穿孔制备得稍大。

[0032] 图 3 为根据本发明实施例的线圈电极 60 的示意性侧视图。该电极装配在管 50 上，如下文中的附图所示。电极 60 通常包含有回弹力的生物相容性导电材料，例如金、铂或铱线材，或者这些金属的合金。线圈电极可包括缠绕成螺旋线圈的线材（如图所示），其形状

与卷簧类似。作为另外一种选择，线圈电极可由管制成，通过（例如）激光切割法将该管沿螺旋图案切开，以形成螺旋形状。线圈电极具有等于或略小于管 50 的外径的内径，以使得线圈正好贴合到管上。

[0033] 现在参见图 4 和 5，图中示意性地示出根据本发明实施例的导管 28 的远端部分 32，该部分是通过将线圈电极 60 装配到管 50 上而制成的。图 4 为侧视图，而图 5 为沿图 4 的 V-V 线截取的剖视图。将电极 60 滑移到管 50 上的所需位置处，然后采用粘合或其他方式使电极紧紧固定在管上的该位置处。管 50 内部的一根或多根线材 62 穿透管的外表面（可能穿过其中一个穿孔 52），并且焊接到电极 60 上或以其他方式与电极 60 结合在一起。类似地，本领域已知的可用于与环形电极建立电连接的任何合适的技术都可以用于此目的。线材 62 穿过导管 28 的近端，并在这里通过电缆 38 连接到 RF 能量产生器 44（图 1）。

[0034] 由图 4 和 5 可知，当电极 60 紧固到管 50 上时会覆盖一些穿孔（在图 5 中标记为 52B）。然而，足够多的穿孔（标记为 52A）仍保持开放，以对电极接触的区域进行充分的冲洗。此布置方法是有利的，因为这样可回避在管 50 内形成穿孔 52 时、以及将电极 60 设置到管上时的高位置精度需要。在消融手术过程中，中央腔 58（图 2）将冲洗流体从冲洗泵 48（图 1）输送到贮存器 56。在电极 60 传送 RF 能消融组织的同时，冲洗流体经穿孔 52A 由管 50 流出进入周围组织。

[0035] 图 6 为根据本发明实施例的装配有线圈电极 76 的环状标测导管 70 的示意性侧视图。环状标测导管插入管被成形为其轴 72 的远端部分 74 大致呈圆形套索形状。这种套索形状可用于（例如）在治疗心房纤颤时沿环肺静脉口的路线消融心肌组织。

[0036] 要沿所需路线同时消融多处位置，需将电极 76 分布在远端部分 74 的周围。采用上述方式将每个电极滑移到所需位置，并紧固和电连接到导管 70 内的线材上。远端部分 74 也可具有用于冲洗的穿孔（图中未示出），就像在导管 28 内的那样。同样，可以沿其他类型导管的长度、以及在其他类型的管状探针上分布多个线圈电极。

[0037] 虽然上述实施例具体涉及心脏内的 RF 消融处理中使用的导管，但本发明的原理可相似地适用于其他器官和其他类型的诊断治疗过程，尤其是涉及向身体组织施加能量的过程。例如，可以将具有相似类型冲洗顶端的装置用于包括使用微波或超声波加热组织的治疗过程。又如，也可在不对其他类型的导管和管状探针进行冲洗的情况下使用上述类型的线圈电极。

[0038] 因此，应当理解，上述实施例是以举例的方式进行阐述，本发明不仅限于上文所具体示出和描述的内容。并且，本发明的范围包括上述各种特征的组合和子组合、以及本领域技术人员在阅读上述说明书时可能想到的并且现有技术中未公开的变型形式和修改形式。

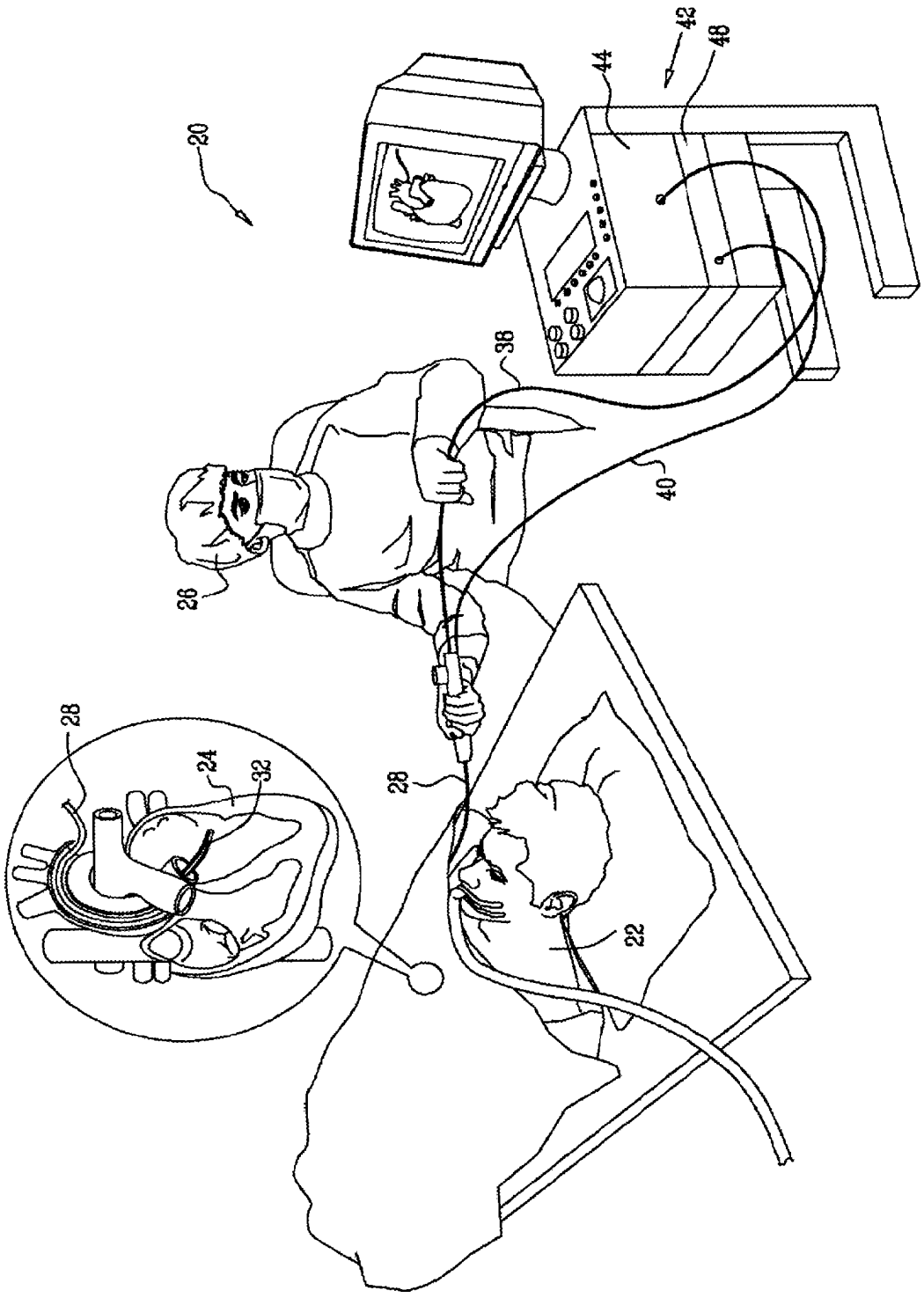


图 1

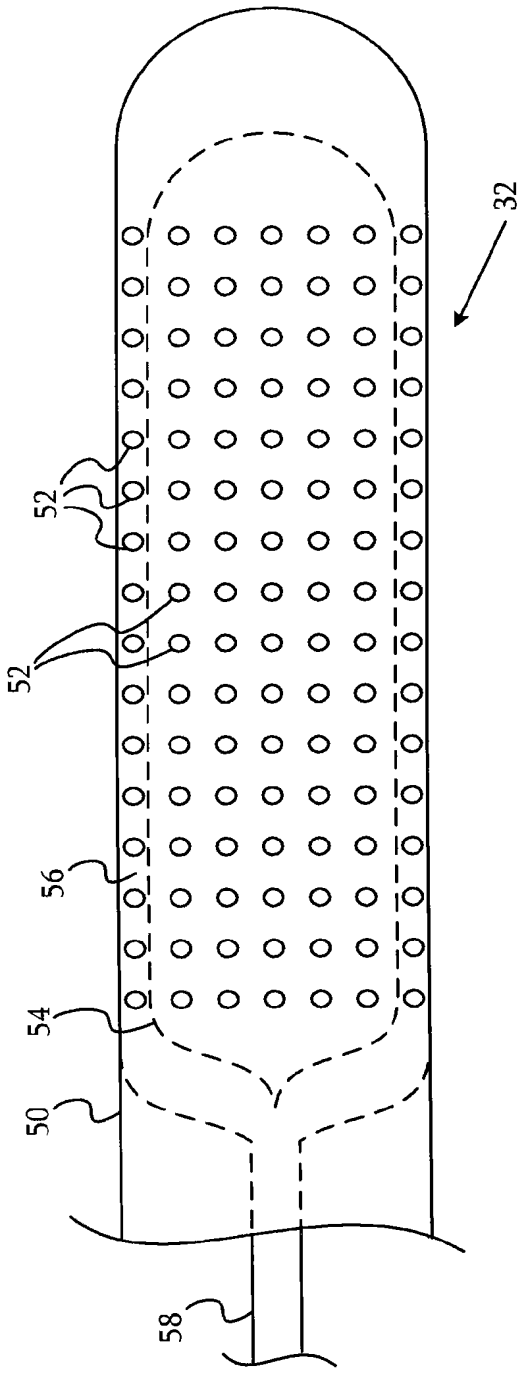


图 2

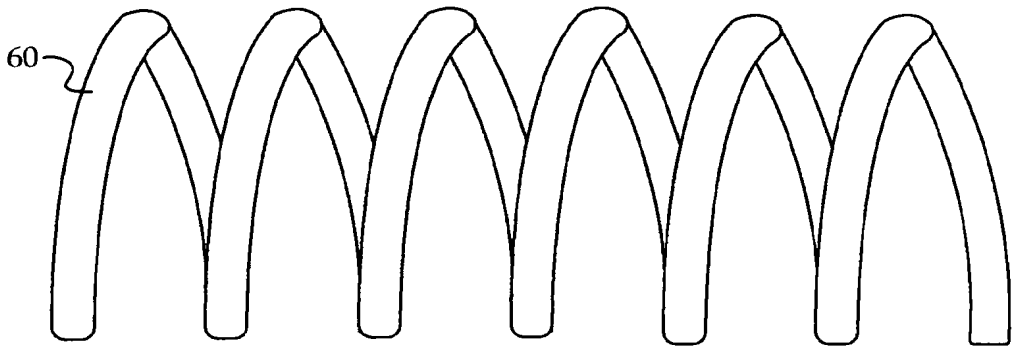


图 3

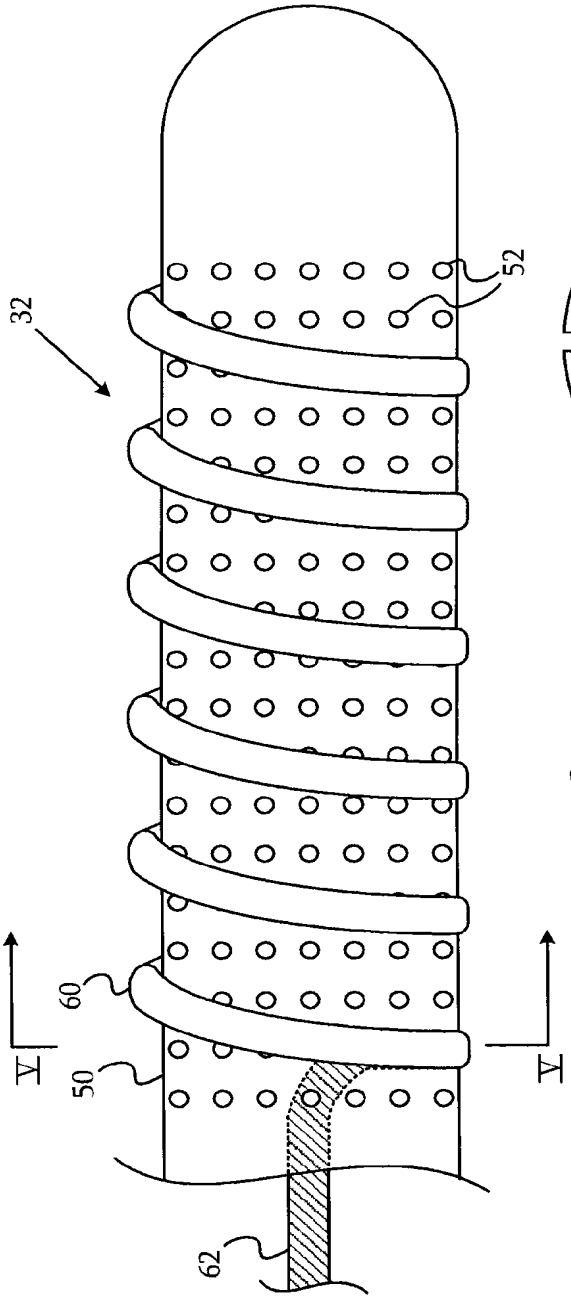


图 4

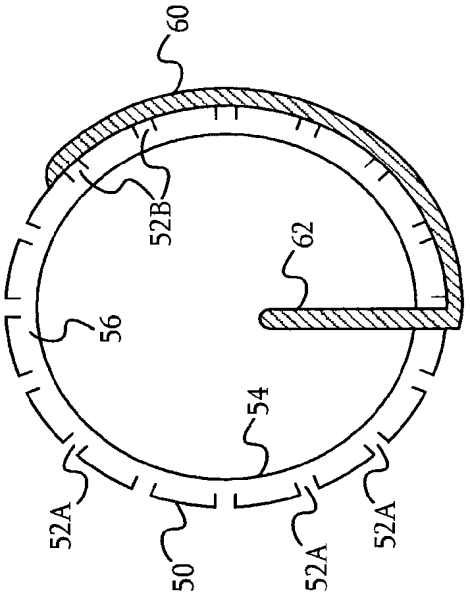


图 5

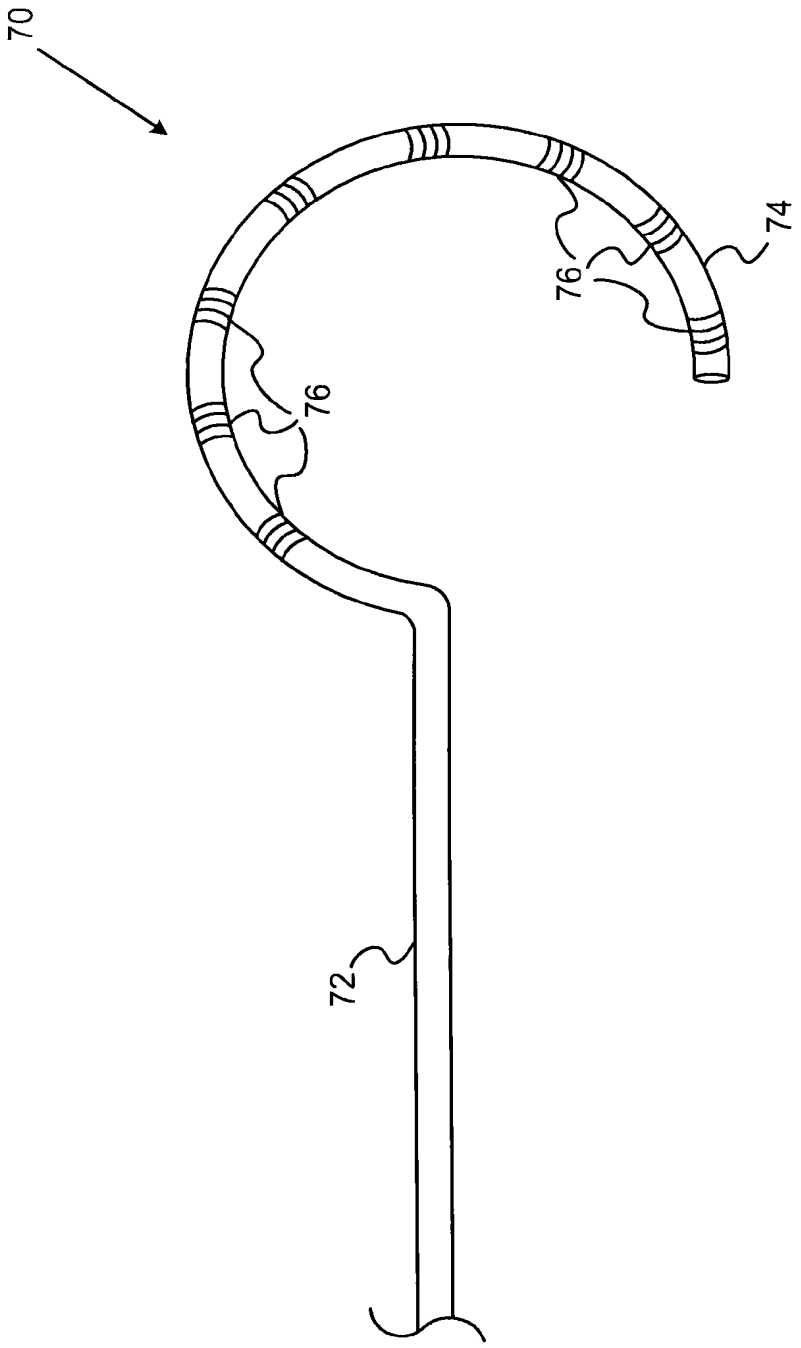


图 6

Espacenet

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Catheter with helical electrode

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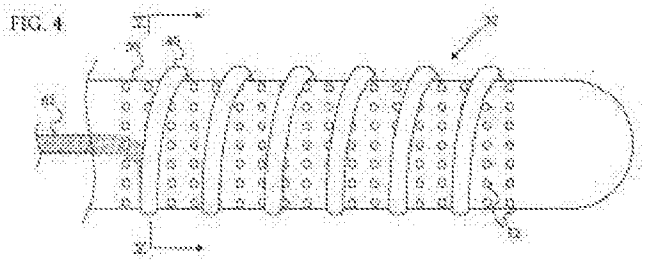
Abstract of CN102138823 (A)



The present invention provides an invasive probe including an insertion tube containing a lumen for providing an irrigation fluid and a distal portion having a plurality of perforations therethrough providing fluid communication between the lumen and an outer surface of the insertion tube. At least one helical electrode is fitted over the distal portion of the insertion tube.

Notice

DESCRIPTION CN102138823

The present invention provides an invasive probe, the invasive probe includes an insertion tube, said insertion tube includes a central lumen and a distal end portion of said central cavity for supplying flushing fluid, and said distal end portion having a plurality of perforations therethrough, the perforations between the central cavity of the insertion tube and the outer surface to provide fluid communication. At least one helical electrode fitted over the distal portion of the insertion tube.

Catheter with a spiral electrode

TECHNICAL FIELD

The present invention generally relates to medical devices, particularly, it relates to a method of cooling an invasive probe in contact with the body tissue.

Background technique

In some medical procedures, in order to concentrate the energy dose applied topically to body tissue, and you want to deal with district cooling to reduce incidental tissue damage.

For example, cardiac ablation therapy used to treat arrhythmia, method to produce a non-conducting lesions in the myocardium by heating with radio frequency energy (RF) tissue. It has been found that the cooling of the ablation site reduces tissue coking and thrombosis. For this purpose, Biosense Webster Inc. (Diamond Bar, California) offers as part of its integrated ablation system of the [image] flush tip of the catheter. The metal catheter tip with RF current to ablate the tissue energized, and having a plurality of processing sites for flushing peripheral holes which surround the periphery of the top of the. Connected to the catheter delivery pump saline solution to the catheter tip, and the solution flows out through the holes in the periphery of the process, so as to cool the catheter tip and the tissue.

SUMMARY

Example embodiments of the present invention described below provides a flush probes for invasive medical procedure (e.g. irrigated catheter for RF ablation), as well as an effective method for preparing such probes.

Thus provided according to an embodiment of the present invention the invasive probe, the probe includes an insertion tube and a distal portion, wherein the insertion tube includes means for providing irrigation fluid lumen, and the distal end portion having a plurality of perforations therethrough , perforations provided between the insertion tube and the outer surface of the lumen in fluid communication. Equipped with at least one helical electrode on the distal portion of the insertion tube.

Generally, a probe is inserted through the tube and including electrically connected to said at least one helical electrode of one or more wires. Additionally or alternatively, the at least one helical electrode covers some of the perforations.

In one embodiment, the at least one helical electrode comprises a plurality of helical electrodes which are distributed along the distal portion.

In the disclosed embodiment, the insertion tube is configured for insertion through a blood vessel subject ventricle, allowing the endocardial tissue of the at least one helical electrode contact within the heart.

Typically, a plurality of perforations comprises at least eight perforations and may include at least fifty perforations. Perforation generally less than 0.5mm, and may be less than 0.2mm diameter. Perforations may have respective longitudinal positions according to their respective sizes that vary.

In one embodiment, the at least one helical electrode comprises a helical coil wound around the distal portion of the insertion tube. In another embodiment, the at least one helical electrode includes a tube cut along a spiral pattern.

According to an embodiment of the present invention also provides a medical device comprising a probe inserted into the body of a subject. The probe includes an insertion tube and a distal portion, wherein the insertion tube includes a central lumen, and the distal end portion having a plurality of perforations therethrough, the perforations providing fluid communication between the lumen of the insertion tube and an outer surface; and, At least one helical electrode fitted on the distal end portion of the insertion tube and configured to contact the body tissue. Energy generator connected to the probe, to provide electrical power to said at least one helical electrode. Flush pump is connected to the central chamber to the central chamber and pierced by irrigation fluid supply to the tissue.

In the disclosed embodiment, the connection of the energy generating at least one helical electrode to the power supply is used to ablate the tissue. For example, the probe may be configured for insertion through a blood vessel into a heart of the subject, to ablate myocardial tissue within the heart.

Further, according to an embodiment of the present invention provides a method of treatment (including inserting a probe into a subject). The probe includes an insertion tube and a distal portion, wherein the insertion tube includes a central lumen, and the distal end portion having a plurality of perforations therethrough, the perforations providing fluid communication between the lumen of the insertion tube and an outer surface; and, At least one helical electrode fitted on the distal end portion of the insertion tube. The at least one helical electrode in contact with the body tissue. Power by at least one helical electrode is applied to the tissue, and rinse fluid supply by the central chamber and perforations to the tissue.

Typically, the supply of flushing fluid is cooled to a distal portion and organizations.

According to an embodiment of the present invention between the further provides a method of manufacturing a medical device, the method comprising passing through the distal end portion including an outer surface of the insertion tube lumen generating a plurality of perforations, whereby the insertion tube lumen and an outer surface It provides fluid communication. Including a conductive material in the at least one helical electrode is slidably inserted into the distal portion of the tube. The at least one helical electrode is then affixed to the outer surface of the distal end of the insertion tube portion.

The following detailed description of embodiments of the drawings, the present invention will be more fully understood:

BRIEF DESCRIPTION

Figure 1 is an embodiment of the present invention for cardiac ablation therapy system schematic illustrating;

Figure 2 is an embodiment of a catheter according to the perforation of the insertion tube of the present invention is a schematic side view;

Figure 3 is a schematic side view of a coil electrode according to the embodiment of the present invention;

Figure 4 is an embodiment of the present invention is equipped with a coil electrode schematic side view of the distal end portion of the piercing catheter;

Figure 5 is a sectional view of the catheter along line V-V of Figure 4 taken schematic; and

Figure 6 is an annular coil electrode mapping catheter schematic side view of the assembly according to an embodiment of the present invention.

detailed description

In the RF power ablation surgery, rinse the ablation site reduces tissue coking, thrombosis, and the ablation electrode and the tissue adhesive. So far, a method and apparatus for flushing the electrode itself needs to be perforated, such that irrigation fluid may be perforated by a duct into the processing area. Such hole electrodes and methods of making perforations in (for example) U.S. Patent submitted by 15 July 2008 Application 12 / 173,150 is described in the patent application assigned to the assignee of the present patent application, and whose disclosure reference incorporated herein. However, the preparation of perforation is a waste of time, cost too much, and may weaken the electrode structure.

The embodiments described below, the present invention provides a ring-shaped electrode prepared with the cleansing function of a simple and economical method. Invasive probe (e.g. catheter) having a plurality of perforations through an outer wall provided in the outer wall of the ring electrode is about the area. The perforations within a probe for transmitting flushing fluid to the perforated central cavity in communication. Conductive coil electrode (the electrode usually has the shape of a spiral spring and resilience) is fitted and secured to the probe at the location of the target electrode. The coil electrode is connected to the probe through one or more wires, these wires can be used (for example) to provide RF power to the coil for ablation therapy. Although the coil electrode disposed generally covers the inner wall of the probe perforations, other perforation gap between the turns of the coil within the coil will not be covered electrode. During the operation, the outflow from these open perforations flushing fluid can rinse the entire processing area.

Illustrated convenient design described above and the subsequent manufacturing drawings, and low cost. This design not only has perforations rinse the electrode can be achieved beneficial effects, but also to avoid the high cost and difficulty in forming perforations will encounter in the electrode. Such an electrode structure can be formed for a plurality of ring electrodes along the catheter or other structures (e.g., lasso structure) in length.

Figure 1 is a system for cardiac ablation therapy, according to an embodiment of the present invention is a schematic illustration of FIG. 20. The operator of the catheter 26 inserted into the vessel 28 through the heart of the subject 22 of the chamber 24, the manipulation of the catheter to the distal end of the catheter contacts the endocardium region portion 32 to be treated. The distal end of the catheter is perforated to allow the rinse treatment area, as shown and described below. However, in other respects, it is similar to the system 20 are known in the art for cardiac ablation system for treating (e.g., the above-mentioned Biosense Webster system), and the components of such systems can be applied to the system 20.

After the distal end portion 32 of catheter 28 positioned at the ablation site, and ensuring that the distal end portion of the electrode (as shown) contacting the endocardial site, operator 26 actuates a radio frequency (RF) within console 42 energy generator 44 through cable 38 to the electrode can supply RF. Meanwhile, rinse the pump 48 through the pipe 40 and 28 within the central lumen catheter to the distal part of the supply of cooling fluid (such as saline solution). Adjustable RF energy generator and the flushing operation of the pump, in order to provide the appropriate volume of irrigation fluid during ablation electrode and the tissue to cool without adding too much to the heart of the flushing fluid. The distal end portion 32 a temperature sensor (not shown) can provide feedback to console 42 for controlling the RF energy dosage and / or flushing fluid volume.

Figure 2 is a catheter according to an embodiment of the present invention, a portion of the insertion tube 50 is a schematic side view of the 28. It is shown in the distal portion of the insertion tube to the distal end portion of the electrode assembly 32 before the manufacturing stage. Tube 50 typically comprises a suitable biocompatible plastic (e.g. polyurethane), and generally having a wall thickness of about 2.3mm and about 0.15mm in diameter.

However, these dimensions are given by way of example only, depending on the application requirements can be larger or smaller size.

The distal end portion of the outer surface of the tube 50 is a plurality of perforations 52 penetrate these perforations longitudinally (i.e. along the longitudinal axis of the catheter 28 in a direction parallel) and circumferentially (along a direction of the circumference around the axis) distributed in the distal tip on the surface. Perforations may be formed by any suitable method known in the art in conduit 50, e.g., pre-molded perforated tube during manufacture, or by punching or drilling (using a laser or mechanical means) in the inner tube in the tube after extrusion forming perforation.

The distal end portion 32 includes an internal reservoir 56, the reservoir chamber 58 from the central tube 50 of the supply flushing fluid. Perforations 52 between the reservoir 56 and the outer surface of the tube 50 extends. In the embodiment shown in the drawings, the reservoir 56 has an inner surface 54, the inner surface can be (e.g.) in a small diameter tube 50 in the mounting tube formation. Alternatively, the reservoir may occupy the entire interior space of the tube 50 at the distal tip, and then near the distal tip plug (not shown) block, and communicating the central chamber 58. Alternative reservoir configurations skilled in the art will be apparent, and will be considered within the scope of the present invention.

Typically, the tube 50 has at least eight perforations diameter of less than 0.5mm, such a configuration can be simultaneously longitudinal and circumferential distribution of flushing fluid in the entire area of □ □ the distal end portion 32 without causing excessive cooling fluid flow to the heart. However, the inventors have found that it is advantageous to have at least fifty perforations in the distal portion and the perforation diameter not larger than 0.2mm, and may be as small as about 0.1mm. Size of the perforations may optionally be varied over the entire length of the distal tip to compensate for pressure variation and ensure that the flow is equal over the entire length. For this purpose, compared with the flushing fluid inlet is closer to the proximal side of the perforation, it may be the most distal tip portion and the vicinity thereof prepared slightly greater than the perforations.

Figure 3 is a schematic side view of a coil electrode 60 according to the embodiment of the present invention. The electrode is mounted on the tube 50, as shown in the drawings below. Electrode 60 typically comprises a resilient biocompatible conductive material, such as gold, platinum or iridium wire, or an alloy of these metals. Coil electrode may comprise a wire wound helical coil (as shown), which is similar to the shape of the coil spring. Alternatively, the coil electrode may be controlled to, by (e.g.) a laser cutting method to cut the tube along a spiral pattern to form a spiral shape. Coil electrode has an inner diameter equal to or slightly smaller than the outer diameter of tube 50, so that the winding up fit to the tube.

Referring now to Figures 4 and 5, which schematically illustrates the distal end of a catheter according to an

embodiment of the present invention, 28 parts of 32, which is formed by the coil electrode portion 60 is fitted to the tube 50 made. Figure 4 is a side view, and FIG. 5 is a sectional view taken along line V-V of Figure 4 taken. The electrode 60 is slipped to the desired position on the tube 50, and then using an adhesive or other means firmly fixed to the electrode at a position on the tube. Inside the tube 50 one or more wires 62 penetrate the outer surface of the tube (possibly through one of perforations 52), and the upper electrode 60 is welded to or otherwise combined with the electrode 60 together. Similarly, known in the art may be used to establish a ring electrode electrically connected to any suitable technique may be used for this purpose. The proximal end of the wire 62 through the catheter 28, and is connected via cable 38 where the RF energy generator 44 (FIG. 1).

As shown in Figures 4 and 5, when the electrode 60 is fastened to the tube 50 will cover a number of perforations (labeled in Figure 5 as 52B). However, a sufficient number of perforations (labeled 52A) remains open to contact with the electrode area of □ □ the full flush. This method is advantageous arrangement, because it can be avoided when the perforations 52 are formed in the inner tube 50, and the electrode 60 is set to the high accuracy position on the tube when required. In the ablation procedure, the central cavity 58 (FIG. 2) Rinse the flushing fluid from the pump 48 (FIG. 1) to the reservoir 56. Electrode 60 can transmit RF ablation of tissue at the same time, the flushing fluid through the perforations 52A by the outflow pipe 50 into the surrounding tissue.

Figure 6 is assembled according to an embodiment of the present invention, the coil electrode lasso 70 a schematic side view 76. Lasso catheter tube is inserted into the distal end of the shaft portion 74 for forming a substantially circular 72 lasso shape. This lasso shape can be used (for example) in the treatment of atrial fibrillation ablation of cardiac tissue along the route circumferential pulmonary vein ostium.

To simultaneously route multiple locations along a desired ablation electrode 76 need to be distributed around the distal end portion 74. With the above manner will slip each electrode to the desired position, and tighten the wire and electrically connected to the conduit 70 inside. The distal end portion 74 may also have perforations (not shown), as in the inside of the catheter 28 for flushing. Similarly, along the length of the other types of catheters, as well as the distribution of the plurality of coil electrodes on other types of tubular probes.

Although the above embodiments relate specifically catheter RF ablation treatment within the heart using, the principles of the present invention can be similarly applied to other organs and other types of diagnosis and treatment process, especially process involves applying energy to the body tissue. For example, the top of a similar type of apparatus for washing treatment comprising the use of a microwave or ultrasonic tissue heating. Another example, of the type described above may also be used in the coil electrode not other types of catheters and tubular probes washing conditions.

Accordingly, it should be understood that the embodiments described above are cited by way of elaboration, the

present invention is not limited to the above-described and illustrated specific content. Further, the scope of the present invention includes both combinations and sub-combinations of the various features, as well as variations and modifications thereof skilled in the art upon reading the foregoing description may think and are not disclosed in the prior art.

Notice

CLAIMS CN102138823

1.

1. An invasive probe, comprising: Insertion tube, said insertion tube includes a central lumen and a distal end portion of said central cavity for supplying flushing fluid, and the distal end portion having a plurality of perforations therethrough, the perforations in said insertion tube between the central lumen and said outer surface to provide fluid communication; and At least one helical electrode fitted in the distal portion of the insertion tube on.

2.

2. The probe according to claim 1, further comprising said tube and electrically connected through said at least one helical electrode to the one or more wires.

3.

3. The probe according to claim 1, wherein said at least one helical electrode covers some of the perforations.

4.

4. The probe according to claim 1, wherein said at least one helical electrode comprises a plurality of spiral electrodes, the plurality of electrodes along the distal portion of the helical profile.

5.

5. The probe according to claim 1, wherein the insertion tube is configured for insertion through a blood vessel into a subject ventricle, so that at least one helical electrode in contact with the endocardial tissue within the heart.

6.

6. The probe according to claim 1, wherein said plurality of perforations comprises at least eight perforations.

7.

7. The probe according to claim 6, wherein said plurality of perforations comprises at least fifty perforations.

8.

8. The probe according to claim 1, wherein the diameter of the perforation is less than 0.5mm.

9.

9. The probe according to claim 8, wherein the perforations diameter of less than 0.2mm.

10.

10. The probe according to claim 1, wherein said perforations having perforations according to the respective longitudinal locations of the respective sizes that vary.

11.

11. The probe according to claim 1, wherein said at least one helical electrode comprises a helical coil wound around the distal portion of the insertion tube.

12.

12. The probe according to claim 1, wherein said at least one helical electrode includes a tube cut along a spiral pattern.

13.

13. Medical devices, including: Probe, for insertion into a body of a subject, the probe comprising: Insertion tube, said insertion tube includes a central lumen and a distal portion, said distal end portion having a plurality of perforations therethrough, the perforations providing fluid communication between the central lumen and an outer surface of the insertion tube ;as well as At least one helical electrode fitted over the distal portion of the insertion tube and is configured to contact the body's tissues; Energy generator, for connection to the probe, to provide electrical power to said at least one helical electrode; and Flush the pump for connection to the central chamber to the central chamber and through the perforations flushing fluid supply to the tissue.

14.

14. The apparatus according to claim 13, wherein said energy generator is connected to said at least one helical electrode to supply electric power to ablate the tissue.

15.

Fifteen. The apparatus according to claim 13, wherein said probe is configured for insertion through a blood vessel into a heart of the subject, to ablate the myocardial tissue within the heart.

16.

16. A method of processing method, comprising: Inserting a probe into a subject, the probe comprising: Insertion tube, said insertion tube includes a central lumen and a distal portion, said distal end portion having a plurality of perforations therethrough, the perforations providing fluid communication between the central lumen and an outer surface of the insertion tube ;as well as At least one helical electrode fitted over the distal portion of the insertion tube; Said at least one helical electrode contact with the tissue within the body; Applying at least one helical electrode to the tissue by the energy; and Flushing fluid supply to the tissue through the central chamber and the perforation.

17.

17. The method according to claim 16, wherein said probe comprises inserting the probe through the blood vessels to penetrate the heart of the subject, and wherein applying the electrical energy comprises the myocardial tissue ablation within the heart.

18.

18. The method according to claim 16, wherein said fluid supply portion and said distal end comprises cooling the tissue.

19.

19. A method for preparing a medical device, comprising: Through the distal end portion including an outer surface of the insertion tube lumen forming a plurality of perforations to provide fluid communication between the lumen of the insertion tube and an outer surface; On the distal portion of the insertion tube contains a sliding electrically conductive material is at least one helical electrode; and The at least one helical electrode is fixed to the outer surface of the distal end of the insertion tube portion.

20.

20. The method of claim 19, further comprising one or more wires through the tube, the wire and electrically connected to at least one of said helical electrode.

21.

twenty one. The method according to claim 19, wherein said at least one helical electrode covers some of the perforations.

twenty two. The method according to claim 19, wherein said slide comprises at least one helical electrode positioned along the distal portion of a plurality of spiral electrodes.

Electronic Acknowledgement Receipt

EFS ID:	24942960
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Bess Telle
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	17-FEB-2016
Filing Date:	24-JAN-2014
Time Stamp:	18:32:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	December_23_2015_Office_Action_issued_in_Chinese_Patent_Application_No_201380010521 9.PDF	335282 dbac01932e81fe917e9b40c55c0386e1d8ae48af	no	4
Warnings:					
Information:					

2	Information Disclosure Statement (IDS) Form (SB08)	Information_Disclosure_Statement_Fillable_PDF.pdf	1034948 40d515dcdce2880766aa42ebf97487968ecbe9c8	no	4
Warnings:					
Information:					
3	Transmittal Letter	Information_Disclosure_Statement.pdf	21960 cf49323e80259b749cb22efb74f94f5390760a72	no	2
Warnings:					
Information:					
4	Foreign Reference	CN102138823A.pdf	552584 48721f93deeded79d08c6325ce4476a9ed3dbbbc	no	12
Warnings:					
Information:					
5	Foreign Reference	Translation_of_CN102138823A.pdf	130434 1dc052c542cf4c397c479b8d7785e6baf452389e	no	14
Warnings:					
Information:					
			Total Files Size (in bytes):	2075208	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/163,528	01/24/2014	Hideo SANAI	153190

CONFIRMATION NO. 1030

POA ACCEPTANCE LETTER

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC00000007841705 4

Date Mailed: 11/03/2015

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/28/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/hsarwari/

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/163,528	01/24/2014	3739	1740	153190	7	1

CONFIRMATION NO. 1030

CORRECTED FILING RECEIPT

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC000000078417087

Date Mailed: 11/03/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Hideo SANAI, Hachioji-shi, JAPAN;

Applicant(s)

OLYMPUS CORPORATION, Tokyo, JAPAN;

Assignment For Published Patent Application

OLYMPUS MEDICAL SYSTEMS CORP., Tokyo, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 25944

Domestic Priority data as claimed by applicant

This application is a CON of PCT/JP2013/060447 04/05/2013
which claims benefit of 61/636,269 04/20/2012

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 02/07/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/163,528**
Projected Publication Date: Not Applicable
Non-Publication Request: No

Early Publication Request: No
Title

SURGICAL DEVICE

Preliminary Class

606

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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OB

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 25944

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (If the Applicant is a juristic entity, list the Applicant name in the box):

OLYMPUS CORPORATION

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Mitsugu Sakai		
Title	General Manager of Intellectual Property Planning Department in Intellectual Property & Licensing Division of Olympus Corporation		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hideo		SANAI	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hachioji-shi	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o OLYMPUS I.P. SERVICES CO., LTD.		
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City	Hachioji-shi, Tokyo	**State/Province**	
Postal Code	192-8512	**Country** i	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	25944		
Email Address	email@oliff.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURGICAL DEVICE		
Attorney Docket Number	153190	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	25944		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	PCT/JP2013/060447	2013-04-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/JP2013/060447	non provisional of	61/636,269	2012-04-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[1] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

UPDATED

PTO/AIA/14 (03-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Remove Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the Inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	~~OLYMPUS MEDICAL SYSTEMS CORP.~~ OLYMPUS CORPORATION		
Mailing Address Information For Applicant:			
Address 1	43-2, Hatagaya 2-chome, Shibuya-ku		
Address 2			
City	Tokyo	**State/Province**	
Country	JP	Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

If the Assignee is an Organization check here. ☒

UPDATED

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	14/163,528
Title of Invention	SURGICAL DEVICE	

Organization Name			
Mailing Address Information For Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country [i]		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature				Date (YYYY-MM-DD)	2015/10/28
First Name	B. Graham	Last Name	Nelson	Registration Number	72,699

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

UPDATED

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Co o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/163,528	01/24/2014		1740	153190	7	1

CONFIRMATION NO. 1030

UPDATED FILING RECEIPT

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC00000006749207

Date Mailed: 04/03/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Hideo SANAI, Hachioji-shi, JAPAN;

Applicant(s)

~~OLYMPUS MEDICAL SYSTEMS CORP.~~, Tokyo, JAPAN → OLYMPUS CORPORATION

Assignment For Published Patent Application

~~OLYMPUS MEDICAL SYSTEMS CORP.~~, Tokyo, JAPAN → OLYMPUS CORPORATION

Power of Attorney: The patent practitioners associated with Customer Number 25944

Domestic Priority data as claimed by applicant

This application is a CON of PCT/JP2013/060447 04/05/2013
which claims benefit of 61/636,269 04/20/2012

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 02/07/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/163,528**
Projected Publication Date: 07/10/2014
Non-Publication Request: No

Early Publication Request: No
Title

SURGICAL DEVICE

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014

For: SURGICAL DEVICE

Attn: OIPE

Group Art Unit: 3739

Docket No.: 153190

REQUEST TO UPDATE NAME OF APPLICANT AND REQUEST FOR CORRECTION OF PALM RECORDS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attached is an Updated Application Data Sheet and marked-up original filing receipt updating the name and address of the Applicant.

In compliance with 37 CFR §3.73(c), the undersigned hereby states that OLYMPUS CORPORATION is the assignee of the entire right, title, and interest in the patent application identified above by virtue of assignment from the inventors or previous owner(s) of the patent application identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 036276, Frame 0543.

The undersigned is authorized to act on behalf of the assignee by virtue of the Power of Attorney submitted herewith. In accordance with 37 CFR §1.36(a), submission of the Power of Attorney revokes any powers of attorney previously given.

Entry of these documents should satisfy the requirements set forth under 37 CFR §3.73(c) to update the name of the Applicant. Therefore, prompt issuance of an Official Filing Receipt bearing the updated name of the Applicant is respectfully solicited.

Respectfully submitted,

/ B. Graham Nelson /

James A. Oliff
Registration No. 27,075

B. Graham Nelson
Registration No. 72,699

JAO:BGN/est

Date: October 28, 2015

Attachments:
Updated Application Data Sheet
Marked-up Filing Receipt
General Power of Attorney

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

Electronic Acknowledgement Receipt

EFS ID:	23918978
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Bess Telle
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	28-OCT-2015
Filing Date:	24-JAN-2014
Time Stamp:	15:48:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	20151028153190_GENPOA.pdf	83741 a11f85722eef225438c23913baf6f8e9ecd32191	no	1

Warnings:	
Information:	

2	Application Data Sheet	20151028153190_MARKEDUPADS.pdf	410662 35a23e00ec69d60a68905bb9d308a32693c27b1b	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Miscellaneous Incoming Letter	20151028153190_MARKEDUPOFR.pdf	211943 02d1827218fe7a3c0a16595aa095cfdea1e08e8c	no	3
Warnings:					
Information:					
4	Miscellaneous Incoming Letter	20151028153190_REQUEST.pdf	52179 868d9b959365977e8318f9c6f548f2988767d39c	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	758525		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5836909	A	1998-11-17	Cosmescu	
	2	5279547	A	1994-01-18	Costin	
	3	5797901	A	1998-08-25	Cosmescu	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080167645	A1	2008-07-10	Woloszko	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14163528
	Filing Date	2014-01-24
	First Named Inventor	Hideo SANAI
	Art Unit	3739
	Examiner Name	J. E. Della
	Attorney Docket Number	153190

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	September 14, 2015 Extended European Search Report issued in European Patent Application No. 13779010.1.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14163528
Filing Date	2014-01-24
First Named Inventor	Hideo SANAI
Art Unit	3739
Examiner Name	J. E. Della
Attorney Docket Number	153190

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/B. Graham Nelson/	Date (YYYY-MM-DD)	2015-10-13
Name/Print	B. Graham Nelson	Registration Number	72699

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Hideo SANAI	Attorney Docket No.: 153190
Application No.: 14/163,528	Confirmation No.: 1030
Filed: January 24, 2014	Art Unit: 3739
For: SURGICAL DEVICE	Examiner: J. E. Della

INFORMATION DISCLOSURE STATEMENT WITH 30-DAY CERTIFICATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 CFR §1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO/SB/08 Form. Unless otherwise indicated herein, one copy of each item(s) is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

☒ 1. This Information Disclosure Statement is being filed before the mailing date of a first Office Action on the merits after the filing of a Request for Continued Examination under 37 CFR §1.114. No certification or fee is required.

☒ 2. Each item of information contained in this Information Disclosure Statement was either first cited in a communication from a patent office in a counterpart foreign or international application or from the USPTO, or is a communication that was issued by a patent office in a counterpart foreign or international application or by the USPTO, and this communication was not received by any individual designated in §1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Respectfully submitted,

Electronic signature: / B. Graham Nelson /
James A. Oliff
Registration No.: 27,075
B. Graham Nelson
Registration No.: 72,699

JAO:BGN/est

Date: October 13, 2015

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

Electronic Acknowledgement Receipt

EFS ID:	23768926
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Bess Telle
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	13-OCT-2015
Filing Date:	24-JAN-2014
Time Stamp:	15:36:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	20151013September_14_2015_Extended_European_Search_Report_issued_in_European_Patent_App.pdf	390444 6df2bc521cccc62b592e30d4b301a4947a44bcb1	no	7

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	20151013Information_Disclosure_Statement_Fillable_PDF.pdf	1034976 f97d06deb306428ac7e4b7eb699aa708b8c2ced2	no	4
Warnings:					
Information:					
3	Transmittal Letter	20151013Information_Disclosure_Statement_02.pdf	20712 ab5149e314d3ffecbdc83065c362db2a48833ec6	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1446132	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014

For: SURGICAL DEVICE

Group Art Unit: 3739

Examiner: J. DELLA

Docket No.: 153190

MAIL STOP RCE

LARGE ENTITY REQUEST FOR
CONTINUED EXAMINATION UNDER 37 C.F.R. §1.114

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In accordance with the provisions of 37 C.F.R. §1.114, Applicant(s) hereby request(s) continued examination (1st request).

☒ Applicant(s) further request(s) entry and consideration of the attached submission.

The above-identified application was filed on or after June 8, 1995. Thus, entry is proper under 37 C.F.R. §1.114(d).

The fees associated with this filing are being paid electronically with this filing. The Commissioner is hereby authorized to charge any additional fee (or credit any overpayment) for this filing to Deposit Account No. 15-0461.

Respectfully submitted,

/ B. Graham Nelson /

James A. Oliff
Registration No. 27,075

B. Graham Nelson
Registration No. 72,699

JAO:BGN/est

Date: October 6, 2015

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

Electronic Patent Application Fee Transmittal

Application Number:	14163528
Filing Date:	24-Jan-2014
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Filer:	James Albert Oliff/Bess Telle
Attorney Docket Number:	153190

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for Continued Examination	1801	1	1200	1200
		Total in USD ($)		**1200**

Electronic Acknowledgement Receipt

EFS ID:	23705814
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Bess Telle
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	06-OCT-2015
Filing Date:	24-JAN-2014
Time Stamp:	15:28:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1200
RAM confirmation Number	1760
Deposit Account	150461
Authorized User	NELSON, GRAHAM

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20151006106l5_Amdt_w_RCE_BGN.pdf	43739 39b164faa47aad3aee753f9069c259026400db64	yes	8

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment Submitted/Entered with Filing of CPA/RCE	1	1
Claims	2	4
Applicant Arguments/Remarks Made in an Amendment	5	8

Warnings:

Information:

2	Request for Continued Examination (RCE)	2015100610-06-15_RCE.pdf	19555 1f1a84e68f7eaf980e6fe596af164ff00d195d30	no	1

Warnings:

This is not a USPTO supplied RCE SB30 form.

Information:

3	Fee Worksheet (SB06)	fee-info.pdf	30439 ecc93b97e8f6f4de859f0a8f91ff5c4ad4d737be	no	2

Warnings:

Information:

Total Files Size (in bytes):	93733

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Group Art Unit: 3739

Application No.: 14/163,528

Examiner: J. DELLA

Filed: January 24, 2014

Docket No.: 153190

For: SURGICAL DEVICE

AMENDMENT WITH REQUEST FOR CONTINUED EXAMINATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In reply to the August 17, 2015 Office Action, and upon entry of the attached Request for Continued Examination, please consider the following:

Amendments to the Claims as reflected in the listing of claims; and

Remarks.

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A surgical apparatus comprising:

a treatment section for treating a living tissue;

an energy generation section for providing high-frequency current to the treatment section;

a liquid feeding conduit for feeding a liquid to the living tissue;

a suction conduit for suctioning the liquid;

an energy control section configured to output a high-frequency output control signal for controlling the high-frequency current from the energy generation section;

a first pump drive section configured to feed the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal from the energy control section, and configured to stop feeding of the liquid from the liquid feeding conduit, when the first pump drive section receives a command for stopping the high-frequency output control signal, wherein the first pump drive section causes the feeding of the liquid from the liquid feeding conduit to terminate at the same time as a stoppage of the output of the high-frequency current; and

a second pump drive section configured to cause the suction conduit to suction the liquid for a predetermined period of time or in a predetermined amount, only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and configured to stop the suction of the liquid from the suction conduit after suctioning for the predetermined period of time or in the predetermined amount.

2. (Previously Presented) The surgical apparatus according to claim 1, wherein

the predetermined period of time or the predetermined amount is stored in a storage section and can be set or changed.

3. (Previously Presented) The surgical apparatus according to claim 1, wherein

the predetermined period of time or the predetermined amount is set according to a period of time of outputting the high-frequency current or a period of time of driving the first pump drive section.

4. (Previously Presented) The surgical apparatus according to claim 1, wherein

upon receipt of an instruction for generating the high-frequency current to the energy generation section after stoppage of the high-frequency current, the energy control section is configured to stop the second pump drive section suctioning the liquid from the liquid feeding conduit.

5. (Previously Presented) The surgical apparatus according to claim 1, further comprising

a pump configured to connect with the suction conduit, wherein the energy control section is configured to perform control so that driving of the pump is started so as to perform the suction of the liquid via the pump, in response to stopping of the high-frequency current of the high-frequency output control signal, and the pump is stopped after suctioning the liquid via the pump for the predetermined period of time or in the predetermined amount.

6. (Canceled)

7. (Previously Presented) The surgical apparatus according to claim 1, comprising

an impedance detection section configured to detect an impedance between two pinching members that are configured to pinch the living tissue in the treatment section,

wherein the predetermined period of time or the predetermined amount varies according to the impedance detected by the impedance detection section.

REMARKS

Claims 1-5 and 7 are pending in this application. By this Amendment, claim 1 is amended. No new matter is added. The claims still sufficiently correspond to the allowed claims in the corresponding Japanese application.

I. Formal Matters

Claim 1 is objected to for an alleged informality. In response, claim 1 is amended as suggested in the Office Action, thus rendering the objection moot.

II. The Pending Claims Define Patentable Subject Matter

Claim 7 is not rejected over any prior art of record in the Office Action. Thus, it is assumed that claim 7 is considered allowable by the Patent Office. Confirmation is respectfully requested.

Claims 1 and 3-5 are rejected under 35 U.S.C. §103(a) over Utley (US 2006/0259029) in view of Mulier (US 2006/0015097). Claim 2 is rejected under 35 U.S.C. §103(a) over Utley in view of Mulier and Kim (US 2011/0040299). In response, Applicant respectfully traverses the rejections.

Independent claim 1 is amended and recites, *inter alia*, "a first pump drive section configured to feed the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal from the energy control section, and configured to stop feeding of the liquid from the liquid feeding conduit, when the first pump drive section receives a command for stopping the high-frequency output control signal, ***wherein the first pump drive section causes the feeding of the liquid from the liquid feeding conduit to terminate at the same time as a stoppage of the output of the high-frequency current***; and a second pump drive section configured to cause the suction conduit to suction the liquid for a predetermined period of time or in a predetermined amount, ***only after*** the second pump drive section receives the command for

stopping the high-frequency output control signal from the energy control section, and configured to stop the suction of the liquid from the suction conduit after suctioning for the predetermined period of time or in the predetermined amount." As shown in Figure 6, the high-frequency current output signal and the feeding pump drive signal are output at the same time (t1) and also stop ***at the same time*** (t2). Also, Figure 6 of this application shows that the suction pump drive signal is output for a predetermined period of time (Ts) ***only after*** the high-frequency current output signal is stopped, and the suction pump drive signal is stopped after the predetermined period of time ends (t3).

The combined teachings of Utley and Mulier fail to render obvious the features recited in independent claim 1. As described in paragraph [0437] of Utley, when the foot pedal 416 is depressed, the fluid is supplied via the fluid delivery apparatus 44 to the treatment site and is simultaneously discharged via the aspirating apparatus 46 from the treatment site in an open loop. During this initial fluid flow, there is no output of radio frequency energy. Then, after the preliminary time period has passed, the controller 52 applies radio frequency energy to the treatment site, at which time the simultaneous delivery and discharge of the fluid is continued. After treatment is complete, the controller 52 stops the radio frequency energy. At this time, the controller 52 commands the ***continued delivery*** and discharge of the fluid through the open loop for a predetermined period of time ***after stopping the radio frequency energy***. Once the predetermined period of time has passed, the flow is fluid is stopped.

It is indicated on pages 5 and 7 of the Office Action that there was previously no requirement in the claims that the delivery of the cooling fluid terminate at the same time as the energy. Accordingly, independent claim 1 is amended to clarify that "the first pump drive section causes the feeding of the liquid from the liquid feeding conduit to terminate ***at the same time*** as a stoppage of the output of the high-frequency current." In contrast, as

acknowledged on page 7 of the Office Action, Utley discloses in paragraph [0452] that, upon termination of the radio frequency energy, the controller 52 commands the ***continued delivery*** of the fluid through the open loop for a predetermined period of time ***after stopping the radio frequency energy***. Accordingly, Utley fails to disclose a pump drive section configured to stop the fluid flow ***at the same time*** as a stoppage of the output of the high-frequency current.

Mulier is relied upon in the Office Action merely for disclosing that suction may be performed during or at the end of an ablation procedure. Mulier fails to remedy the deficiencies of Utley with respect to independent claim 1 because Mulier likewise fails to teach or even suggest the claimed first pump drive section which "causes the feeding of the liquid from the liquid feeding conduit to terminate ***at the same time*** as a stoppage of the output of the high-frequency current." Kim is relied upon in the Office Action merely for disclosing an operation panel of a medical treatment device, and Kim likewise fails to suggest the claimed features. For at least the above reasons, withdrawal of the rejections is respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

/ B. Graham Nelson /

James A. Oliff
Registration No. 27,075

B. Graham Nelson
Registration No. 72,699

JAO:BGN/est

Attachment:
Request for Continued Examination

Date: October 6, 2015

OLIFF PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/163,528	Filing Date 01/24/2014	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **10/06/2015**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 6	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/LYNNELL JOHNSON/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

25944 7590 08/17/2015

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
DELLA, JAYMI E	

ART UNIT	PAPER NUMBER
3739	

NOTIFICATION DATE	DELIVERY MODE
08/17/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
jarmstrong@oliff.com

Office Action Summary	Application No. 14/163,528	Applicant(s) SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/30/2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. The following is a Final Office Action on the merits.

2. The present application is being examined under the pre-AIA first to invent provisions.

3. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

Response to Amendment

4. Acknowledgment is made to the amendment received 7/30/2015

5. Applicant's amendments to the claims are sufficient to overcome the claim objections set forth in the previous office action.

6. Applicant's amendments to the claims are sufficient to overcome the 35 USC 101 rejections set forth in the previous office action.

7. Applicant's amendments to the claims are sufficient to overcome the 35 USC 112(b), second paragraph rejections set forth in the previous office action.

Claim Objections

8. **Claim 1** is objected to because of the following informalities: amend "stop suction" to -stop the suction- in ll. 19. Appropriate correction is required.

Claim Rejections - 35 USC § 103

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claims 1 & 3-5 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Utley et al. (2006/0259029, previously cited) in view of Mulier et al. (2006/0015097).

11. Concerning **claim 1**, as illustrated in Fig. 82, Utley et al. disclose **a surgical apparatus** (system 24; [0120]) **comprising:**

a treatment section for treating a living tissue (operative element 36; [0125]);

an energy generation section for providing high-frequency current to the treatment section (generator 38 supplies radiofrequency treatment energy; [0130]);

a liquid feeding conduit for feeding a liquid to the living tissue (fluid delivery apparatus 44 conveys processing fluid F through the lumen 98 for discharge at the treatment site; [0179]);

a suction conduit for suctioning the liquid (aspirating apparatus 46 conveys aspirated material from or near from the operative element 36 through lumen 102 for discharge; [0133], [0180]);

an energy control section configured to output a high-frequency output control signal for controlling the high-frequency current from the energy generation section (controller 52 governs the power levels, cycles, and duration of radio frequency energy as well as delivery of processing fluid, and if desired, the removal of aspirated material; [0135]);

a first pump drive section that configured to feed the liquid from the liquid feeding conduit while the high-frequency current is output (fluid delivery apparatus 44 comprises an integrated pump 428 that is coupled to the I/O device 54; [0394-0395)**, in response to a command for an output of the high- frequency output control signal from the energy control section, and configured to stop feeding of the liquid from the liquid feeding conduit, when the first pump drive section receives a command for stopping the high- frequency output control signal** (when the foot pedal 416 is pressed, the controller 52 activates the pump rotor 428 and cooling liquid is conveyed through the treatment device TD into contact with mucosal tissue at the targeted site and after a preliminary time period, the controller 52 applies rf energy through the electrodes, and controller 52 terminates the conveyance of rf ablation energy and commands a flow of cooling liquid for a predetermined time after the energy is stopped; [0437-0438], [0451-0452])**; and**

a second pump drive section configured to cause the suction conduit to suction the liquid (an additional dedicated pump rotor or equivalent pumping mechanism to perform the aspiration function; [0399]) **for a predetermined period of time or in a predetermined amount, after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and configured to stop suction of the liquid from the suction conduit after suctioning for the predetermined period of time or in the predetermined amount** (controller 52 terminates the conveyance of rf ablation energy

and commands aspiration from the treatment device for a predetermined time after the energy is stopped in conjunction with the flow of cooling liquid; [0451-0452]).

Utely et al. fail to disclose the second pump drive section configured to cause suctioning only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control suction. However, Mulier et al. disclose a surgical apparatus (20) comprising an energy generation section (22) where suctioning is provided either during or subsequent to termination of the application of RF power to tissue. It would have been an obvious matter of design choice to one having ordinary skill in the art at the time the invention was made to suction only after receiving a command for stopping energy delivery since Mulier et al. teaches suctioning during energy delivery and after termination of energy delivery to be equivalents in the art.

The Examiner notes to Applicant that there is no requirement in the claims for the delivery of the cooling fluid to terminate at the same time as the energy.

12. Concerning **claim 3**, Utely et al. disclose the predetermined time to be set according to the period of time for driving the first pump (428) ([0451-0452]).

13. Concerning **claim 4**, Utely et al. disclose that the energy control section (52) stops the second pump after receiving the instruction to stop the output of energy ([0451-0452]; Fig. 82).

14. Concerning **claim 5**, Utely et al. disclose controlling the driving of the second suction pump to start when the high frequency energy is stopped, and stopping the

second pump after the liquid has been supplied for the predetermined period of time ([0452]).

15. Claim 2 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Utely (2006/0259029, previously cited), as applied to claim 1, in view of Kim et al. (2011/0040299, previously cited).

16. Concerning **claim 2**, Utely et al. disclose the predetermined period of time to be stored in a storage section of generator (52) ([0134], [0437]). While Utely et al. disclose an I/O device (54) to input control and processing variables ([0136]), Utely et al. fail to specifically disclose the predetermined period of time configured to be set or changed. However, Kim et al. disclose a surgical apparatus comprising a front panel (2305) of an energy control section (2301) that includes display and time set elements for various parameters of the surgical apparatus ([0034]). At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the invention of Utely in such that the predetermined period can be set or changed in order to provide the benefit of user control on the input time parameters as taught by Kim et al. ([0034]; Fig. 1)

Response to Arguments

17. Applicant's arguments are moot in view of the new ground(s) of rejection with respect to the amended limitation of the "second pump drive section".

18. Applicant's arguments have been fully considered but they are not found to be persuasive with respect to the amended limitation of the "first pump drive section".

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the delivery of cooling fluid terminates at the same time as the energy) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The phrase "when", as used in the limitation "configured to stop feeding of the liquid from the liquid feeding conduit, when the first pump drive section receives a command for stopping the high-frequency output control signal" does not *require* the pump to stop supplying the liquid immediately. Since Utely discloses supplying liquid for a few seconds after terminating the energy, Utely just discloses stopping the liquid a few seconds after "when" the command is received.

19. Applicant's arguments are moot in view of the new ground(s) of rejection with respect to the reference of Yachi et al.

Conclusion

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAYMI DELLA whose telephone number is (571)270-1429. The examiner can normally be reached on M-Th 8:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda Dvorak can be reached on (571)272-4764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAYMI DELLA/
Primary Examiner, Art Unit 3739

Notice of References Cited	Application/Control No. 14/163,528	Applicant(s)/Patent Under Reexamination SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0015097	01-2006	Mulier et al.	606/041
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14163528	SANAI, HIDEO
	Examiner	Art Unit
	JAYMI DELLA	3739

CPC- SEARCHED		
Symbol	Date	Examiner
((A61B17/320092 OR A61B18/14 OR A61B18/1445 OR A61B2218/002 OR A61B2218/007).CPC.)	2015/04/07	JD
((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/0	2015/04/07	JD

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see EAST search history	2015/04/29	JD
updated EAST search	2015/08/07	JD

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/JAYMI DELLA/ Primary Examiner.Art Unit 3739

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	14755	(606/32-52).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 08:52
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L4	3738	1 and 2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 08:53
L5	5945753	stop or stopped or stopping or halt or halted or halting or terminate or terminating or termination or terminated or stoppage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 08:54
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L7	2232	5 with (energy or power or voltage or current or frequency or wave$form) with 2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 09:14
L8	34	1 and 7	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/07 09:14
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L10	1	("20060265035").PN.	US-PGPUB; USPAT;	OR	OFF	2015/08/07 10:30

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L11	1	("20110040299").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 11:30
L12	1	("20060015097").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/07 11:44
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S2	8620	(olympus and medical and systems).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S3	304	hatta-shinji$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S4	8	(S1 or S3) and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S5	15	(S1 or S3) and (pump or pumping or pumped) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S6	7	S5 not S4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S7	277	S2 and (pump or pumping or pumped) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:36
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S11	1374	a61c1/07.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S12	3466	a61f9/00745.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S13	294	a61f2013/15869.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S14	1868	a61h23/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54
S15	190	a61h39/007.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54
S16	1667	a61m11/005.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:55
S18	63	a61m2205/3693.cpc.	US-PGPUB; USPAT;	OR	OFF	2015/04/07 20:56

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S22	2	"14163203"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
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S24	4949	(S21 or S23) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
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S28	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38
S29	827287	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (output or current or voltage or power or energy)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
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S34	605	S26 and S28 and S29 and S30 and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:40
S35	235	S26 and S28 and S30 and (S31 same S29)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 09:15
S36	56	(S28 and (S26 same S32) and (S29 same S31) and (S26 same S30))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 09:32
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S55	1	("5417709").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:10
S56	213	("2397823" | "3019790" | "3980086" | "4646751" | "4750488" | "4763668" | "4880015" | "5016614" | "5123902" | "5131379" | "5141519" | "5152778" | "5195958" | "5197968" | "5209747" | "5217460" | "5224931" | "5286255" | "5300087" | "5312391").PN. OR ("5417709").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:13
S58	113	S56 and (suction or suctioned or suctioning or aspirate or aspiration or	US-PGPUB; USPAT;	OR	OFF	2015/04/08 15:15

		aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S59	9	S56 and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline) and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 15:17
S60	1	("20050010212").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:23
S61	1	(10/206842).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:26
S62	275280	((stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) near3 (energy or current or voltage or power)) with ((commence or commenced or commencing or start or started or starting or begin or beginning or begun or activate or activation or activating or activated) near3 (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)(output or current or voltage or power or energy))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:02
S63	611	S47 and S62 and S50	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:03
S65	20	S47 and S62 and S50 and S51 and S49	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:03
S66	4478	((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:27

		concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)				
S67	278197	("128" or "606" or "607").clas.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S68	552	S66 and S67	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
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S70	9	S67 and S69	US-PGPUB; USPAT;	OR	OFF	2015/04/08 16:28

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S71	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:36
S72	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:37

		(radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and (controller or micro$controller or processor or micro$processor or cpu or control$unit)				
S73	12	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:39
S74	1	("20080167645").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 16:41
S75	44	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49

		voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))				
S76	697	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and S67 and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49
S77	3	(("8523850") or ("8523851") or ("8523852")).PN.	US-PGPUB; USPAT;	OR	OFF	2015/04/08 17:18

			USOCR			
S78	1	("20100042101").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 10:22
S79	0	("2009015705").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:05
S80	1	("20090157075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:05
S81	1	("6306131").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:11
S82	113	(high$frequency or radio$frequency) with microwave with ultrasonic$4 with cryogen$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:40
S83	5145	(606/32-38).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 11:40
S84	15	S82 and S83	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:40
S85	10028	(high$frequency or radio$frequency) with ultrasonic$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:47
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S87	35	S83 and S85 and (forcep or jaw)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/06 11:49
S88	1	("20070225697").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/06 12:21

EAST Search History (Interference)

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8/7/2015 11:44:55 AM

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Group Art Unit: 3739

Application No.: 14/163,528

Examiner: J. DELLA

Filed: January 24, 2014

Docket No.: 153190

For: SURGICAL DEVICE

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In reply to the May 4, 2015 Office Action, please consider the following:

Amendments to the Specification;

Amendments to the Claims as reflected in the listing of claims; and

Remarks.

Amendments to the Specification:

Please amend the paragraph beginning at line 27 of page 4 as follows:

Furthermore, at a distal end portion of the treatment unit 21, an opening portion 21a for feeding saline is provided, and the opening portion 21a is connected to a tube 21b inserted inside the sheath portion 32. As indicated by dotted arrow a in Fig. 1, the opening portion 21a and a tube ~~13b~~ 21b are disposed so that saline is fed and dripped toward a pinching part between the probe 31a and the movable member 31b in the treatment section 31. Accordingly, the opening portion 21a is a liquid feeding port provided in the treatment section 31, for feeding saline from the tube 21b, which is a liquid feeding conduit, between a living tissue and the treatment section 31.

Please amend the paragraph beginning at line 15 of page 13 as follows:

Accordingly, the projection portion 51 and the receiving member 52 in the handle portion 36A form a liquid suction restricting mechanism arranged at a position midway in the suction tube 21d, the liquid suction restricting mechanism restricting the flow of a suctioned liquid inside the suction tube 21d in response to an operation of the movable handle ~~36~~36b1, which is an operating handle.

Please amend the paragraph beginning at line 22 of page 14 as follows:

When the surgeon opens the handle portion 36A along with the stoppage of the energy output, the projection portion 51 no longer presses the suction tube 21d, and thus suction is started. As a result, saline is suctioned from the opening portion 21c at a distal end portion of a sheath portion 32 in the treatment instrument ~~11~~11A. In Fig. 10, at a time t12, the energy output is stopped and suction is started.

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A surgical apparatus comprising:

a treatment section for treating a living tissue;

an energy generation section for providing high-frequency current to the treatment section;

a liquid feeding conduit for feeding a liquid to the living tissue;

a suction conduit for suctioning the liquid;

an energy control section ~~that outputs~~configured to output a high-frequency output control signal for controlling the high-frequency current from the energy generation section;

a first pump drive section ~~that feeds~~configured to feed the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal from the energy control section, and ~~stops~~ configured to stop feeding of the liquid from the liquid feeding conduit, ~~in response to~~when the first pump drive section receives a command for stopping the high-frequency output control signal; and

a second pump drive section ~~that suctions~~configured to cause the suction conduit to suction the liquid ~~from the suction conduit~~ for a predetermined period of time or in a predetermined amount, ~~in response to a~~only after the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and ~~stops~~ configured to stop suction of the liquid from the suction conduit after ~~the suction~~suctioning for the predetermined period of time or in the predetermined amount.

2. (Currently Amended) The surgical apparatus according to claim 1, wherein

the predetermined period of time or the predetermined amount is stored in a storage section and can be ~~set/changed~~set or changed.

3. (Currently Amended) The surgical apparatus according to claim 1, wherein the predetermined period of time or the predetermined amount is set according to a period of time of outputting the high-frequency current ~~energy~~ or a period of time of driving the first pump drive section.

4. (Currently Amended) The surgical apparatus according to claim 1, wherein upon receipt of an instruction for generating the high-frequency current ~~energy~~ to the energy generation section after stoppage of the high-frequency current~~output of the energy~~, the energy control section ~~stops~~ is configured to stop the second pump drive section suctioning the liquid from the liquid feeding conduit.

5. (Currently Amended) The surgical apparatus according to claim 1, further comprising

a pump configured to connect with the suction conduit, wherein the energy control section ~~performs~~ is configured to perform control so that driving of the ~~second~~ pump is started so as to perform the suction of the liquid via the ~~second~~ pump, in response to ~~the stoppage~~ stopping of the high-frequency current ~~output~~ of the high-frequency output control signal, and the pump is stopped after ~~supply of~~suctioning the liquid via the ~~second~~ pump for the predetermined period of time or in the predetermined amount.

6. (Canceled)

7. (Currently Amended) The surgical apparatus according to claim 1, comprising

an impedance detection section ~~that detects~~configured to detect an impedance between two pinching members that are configured to pinch the living tissue in the treatment section,

wherein the predetermined period of time or the predetermined amount varies according to the impedance detected by the impedance detection section.

REMARKS

Claims 1-5 and 7 are pending in this application. By this Amendment, the specification and claims 1-5 and 7 are amended to clarify the recited features. No new matter is added.

I. Formal Matters

The Abstract is objected to for allegedly exceeding 150 words. However, the Abstract submitted with the Preliminary Amendment of March 24, 2014 in fact only has 147 words. Applicant notes that a hyphenated word is a single word (e.g., "high-frequency"). Withdrawal of the objection is respectfully requested.

Claims 1 and 5 are objected to for informalities. In response, claims 1 and 5 are amended as suggested in the Office Action, thus rendering the objection moot.

Claims 1-5 and 7 are rejected under 35 U.S.C. §101 as not being drawn to statutory subject matter. In response, the claims have been amended to clarify that the claims are drawn to a machine by reciting "configured to," as suggested in the Office Action, thus rendering this rejection moot.

Claims 1-5 and 7 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. In response, the claims have been amended to clarify that the claims are drawn to a machine by reciting "configured to," as suggested in the Office Action, thus rendering this rejection moot. The claims have also been amended to resolve the remaining issues based on the suggestions offered in the Office Action, thus rendering this rejection moot.

II. The Pending Claims Define Patentable Subject Matter

Claims 1 and 3-5 are rejected under 35 U.S.C. §102(b) over Utley (US 2006/0259029). Claims 1, 3 and 4 are rejected under 35 U.S.C. §102(b) over Yachi (US 2006/0265035). In response, Applicant respectfully traverses the rejections.

Independent claim 1 recites, *inter alia*, "a first pump drive section configured to ***feed*** the liquid from the liquid feeding conduit ***while*** the high-frequency current is output, ***in response to*** a command for an output of the high-frequency output control signal from the energy control section, and configured to ***stop*** feeding of the liquid from the liquid feeding conduit, ***when*** the first pump drive section receives a command for stopping the high-frequency output control signal; and a second pump drive section configured to cause the suction conduit to ***suction*** the liquid for a predetermined period of time or in a predetermined amount, ***only after*** the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section, and configured to ***stop*** suction of the liquid from the suction conduit ***after*** suctioning for the predetermined period of time or in the predetermined amount."

The claimed features may be understood with reference to Figure 6 of this application. As shown in Figure 6, the high-frequency current output signal and the feeding pump drive signal are output at the same time (t1) and also stop ***at the same time*** (t2). Also, Figure 6 shows that the suction pump drive signal is output for a predetermined period of time (Ts) ***only after*** the high-frequency current output signal is stopped, and the suction pump drive signal is stopped after the predetermined period of time ends (t3).

Utley fails to teach the features recited in independent claim 1. Utley discloses a treatment system 24 which includes an operative element 36, a generator 38 which supplies radio frequency energy to the treatment site, a fluid delivery apparatus 44 which supplies fluid to the treatment site, and an aspirating apparatus 46 which discharges aspirated material from the treatment site. As described in paragraph [0437] of Utley, when the foot pedal 416 is depressed, the fluid is supplied via the fluid delivery apparatus 44 to the treatment site and is simultaneously discharged via the aspirating apparatus 46 from the treatment site in an open loop. During this initial fluid flow, there is no output of radio frequency energy. Then,

after the preliminary time period has passed, the controller 52 applies radio frequency energy to the treatment site, at which time the simultaneous delivery and discharge of the fluid is continued. After treatment is complete, the controller 52 stops the radio frequency energy. At this time, the controller 52 commands the continued delivery and discharge of the fluid through the open loop for a predetermined period of time after stopping the radio frequency energy. Once the predetermined period of time has passed, the flow is fluid is stopped.

Utley is deficient with respect to independent claim 1 for at least the following reasons. It is indicated on page 13 of the Office Action that there was previously no requirement in the claims that the delivery of the cooling fluid terminate at the same time as the energy. Accordingly, independent claim 1 is amended to recite that the first pump drive section is "configured to ***stop*** feeding of the liquid from the liquid feeding conduit, ***when*** the first pump drive section receives a command for stopping the high-frequency output control signal." In contrast, Utley discloses in paragraph [0452] that, upon termination of the radio frequency energy, the controller 52 commands the ***continued*** delivery and discharge of the fluid through the open loop for a predetermined period of time after stopping the radio frequency energy. Accordingly, Utley fails to teach a pump drive section configured to stop the fluid flow ***when*** the pump drive section receives a command for stopping the radio frequency energy. For at least this reason, independent claim 1 is not anticipated by Utley. Withdrawal of the rejection is respectfully requested.

In addition, it is indicated on page 14 of the Office Action that there was previously no requirement in the claims that the suctioning occur only after termination of the energy. Accordingly, independent claim 1 is amended to recite that the second pump drive section is "configured to cause the suction conduit to suction the liquid for a predetermined period of time or in a predetermined amount, ***only after*** the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control

section." In contrast, Utley discloses that the aspirating apparatus 46 is continuously discharging fluid ***even before*** the radio frequency energy is output, and furthermore continues discharging fluid ***while*** radio frequency energy is applied to the treatment site. Clearly the fluid is discharged in Utley before the command for stopping radio frequency energy is received. Utley thus fails to teach causing the aspirating apparatus 46 to discharge the fluid "***only after*** the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section." For this reason also, independent claim 1 is not anticipated by Utley. Withdrawal of the rejection is respectfully requested.

Yachi likewise fails to teach the features recited in independent claim 1. In the ninth embodiment of Yachi shown in Figure 41 (and relied upon in the rejection), Yachi discloses a treatment process in which the following steps are taken: (a) the ultrasonic vibration switch is turned on; (b) water supply and water suction are stopped; (c) the ultrasonic output is started for treating tissue via ultrasonic driving; (d) a control signal is sent to begin suction, such that "suction is performed substantially at the same time with ultrasonic driving" (paragraph [0284]); (e) when treatment is finished, the ultrasonic vibration switch is turned off; (f) then a fluid is supplied and is continued together with the suction for a predetermined amount of time; and (g) after the predetermined amount of time has passed, the fluid supply and suction are stopped, and the routine is finished.

Yachi thus fails to disclose "a first pump drive section configured to ***feed*** the liquid from the liquid feeding conduit ***while*** the high-frequency current is output" as recited in independent claim 1. As explained in paragraphs [0282] and [0283] and as shown in the flowchart of Figure 41, Yachi teaches outputting ultrasonic energy only after it has been determined that there is ***no*** fluid being supplied. Turning the ultrasonic switch on in Step 31 is ***different*** than outputting the ultrasonic energy in Step 42. Yachi teaches that the ultrasonic

energy is output only after it has been determined that there is ***no*** fluid being supplied (i.e., that the water supply has been stopped). Indeed, as described in paragraph [0106], the fluid is supplied for the purpose of cooling the instrument after it has been heated by the ultrasonic energy; the fluid is not supplied while the ultrasonic treatment is occurring. Accordingly, Yachi fails to teach "a first pump drive section configured to ***feed*** the liquid from the liquid feeding conduit ***while*** the high-frequency current is output." For at least this reason, withdrawal of the rejection is respectfully requested.

Yachi also fails to teach "configured to ***stop*** feeding of the liquid from the liquid feeding conduit, ***when*** the first pump drive section receives a command for stopping the high-frequency output control signal." On the contrary, in Yachi the water supply is stopped ***before*** ultrasonic output is even started. There is ***no*** teaching to stop the water supply when a command for ***stopping*** the ultrasonic output is received. For this reason also, independent claim 1 is not anticipated by Yachi. Withdrawal of the rejection is respectfully requested.

Yachi further fails to teach "configured to cause the suction conduit to suction the liquid for a predetermined period of time or in a predetermined amount, ***only after*** the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section." In contrast, Yachi discloses that the suction is operated at the ***same time*** as the ultrasonic driving: "suction is performed substantially at the same time with ultrasonic driving" (paragraph [0284]). Yachi thus fails to teach causing the suction to be performed "***only after*** the second pump drive section receives the command for stopping the high-frequency output control signal from the energy control section." For this reason also, independent claim 1 is not anticipated by Yachi. Withdrawal of the rejection is respectfully requested.

Claim 2 is rejected under 35 U.S.C. §103(a) over Yachi in view of Kim (US 2011/0040299). In response, Applicant respectfully traverses the rejection. As discussed

above, Yachi is deficient with respect to independent claim 1. Kim fails to remedy the deficiencies of Yachi because Kim neither teaches nor suggests the features recited in independent claim 1, including the claimed first and second pump drive sections. Accordingly, the combined teachings of Yachi and Kim would not have rendered obvious the surgical apparatus of independent claim 1. Withdrawal of the rejection is respectfully requested.

Claim 7 is not rejected over any prior art of record in the Office Action. Thus, it is assumed that claim 7 will be allowable upon withdrawal of the 35 U.S.C. §101 and 35 U.S.C. §112 rejections.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

/ B. Graham Nelson /

James A. Oliff
Registration No. 27,075

B. Graham Nelson
Registration No. 72,699

JAO:BGN/cbb

Date: July 30, 2015

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Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
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Time Stamp:	15:54:31
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2015073072915_Amdt_BGN.pdf	48755 d1635a2852c3e1de58a5ff5682e9b5deabb5dcb0	yes	12

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Specification	2	2
	Claims	3	5
	Applicant Arguments/Remarks Made in an Amendment	6	12

Warnings:	
Information:	
Total Files Size (in bytes):	48755

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/163,528	Filing Date 01/24/2014	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **07/30/2015**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 6	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/CORALIA BETANCOURT/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

25944 7590 05/04/2015

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P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
DELLA, JAYMI E	

ART UNIT	PAPER NUMBER
3739	

NOTIFICATION DATE	DELIVERY MODE
05/04/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
jarmstrong@oliff.com

Office Action Summary	Application No. 14/163,528	Applicant(s) SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/30/2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5 and 7* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) *1-5 & 7* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *1/24/2014*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. The following is a First Action, Non-Final Office Action on the merits.

Notice of Pre-AIA or AIA Status

2. The present application is being examined under the pre-AIA first to invent provisions.

3. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

Priority

4. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 365 (c) & 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112,

except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosure of the prior-filed application, Application Nos. PCT/JP2013/060447 & 61/636269 provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application.

Accordingly, the claims are given the priority date of 4/20/2012.

Specification

5. The abstract of the disclosure is objected to because it exceeds 150 words. Correction is required. See MPEP § 608.01(b).

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

> The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.
>
> The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Objections

7. **Claim 1** is objected to because of the following informalities: amend "and stops suction of the liquid from the suction conduit after the suction for the predetermined period of time or in the predetermined amount" to -and stops suction of the liquid from the suction conduit after suctioning for the predetermined period of time or in the predetermined amount- in ll. 16-18. Appropriate correction is required.

8. **Claim 5** is objected to because of the following informalities: amend "suction" to –the suction- in ll. 3. Appropriate correction is required.

9. **Claim 5** is objected to because of the following informalities: amend "after supply of the liquid via the second pump for the predetermined period of time or in the predetermined amount" to -after supplying the liquid via the second pump for the predetermined period of time or in the predetermined amount- in ll. 4-5. Appropriate correction is required.

Claim Rejections - 35 USC § 101

10. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

11. Claims 1-5 & 7 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

12. **Claim 1** recites the limitation "a first pump drive section that feeds" in ll. 9, making it a claim that is directed to neither a "process" nor a "machine", but rather

embraces or overlaps two different statutory classes of invention due to the active verb "feeds". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

13. **Claim 1** recites the limitation "a first pump drive section that …stops feeding of the liquid" in ll. 11, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "stops". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

14. **Claim 1** recites the limitation "a second pump drive section that suctions" in ll. 14, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "suctions". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

15. **Claim 1** recites the limitation "a second pump drive section that …stops suction of the liquid" in ll. 11, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "stops". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

16. **Claim 4** recites the limitation "the energy control section stops the second pump" in ll. 3, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "stops". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

17. **Claim 5** recites the limitation "the energy control section performs control" in ll. 1-2, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "performs". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

18. **Claim 7** recites the limitation "an impedance detection section that detects an impedance" in ll. 1-2, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "detects". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

19. **Claim 7** recites the limitation "two pinching members that pinch the living tissue" in ll. 2-3, making it a claim that is directed to neither a "process" nor a "machine", but rather embraces or overlaps two different statutory classes of invention due to the active verb "pinch". See MPEP 2173.05(p)II and 35 USC 112, second paragraph rejection below.

Claim Rejections - 35 USC § 112

20. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

21. Claims 1-5 & 7 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

22. Claim 1 recites the limitation "a first pump drive section that feeds" in ll. 9, making it a claim that is directed to neither a "process" nor a "machine". It is unclear if the claim is a product claim or a process claim due to the active verb "feeds". (See MPEP 2173.05(p)II). It is suggested to amend "that feeds" to –that is configured to feed- in ll. 9. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

23. Claim 1 recites the limitation "a first pump drive section that …stops feeding of the liquid" in ll. 11, making it a claim that is directed to neither a "process" nor a "machine". It is unclear if the claim is a product claim or a process claim due to the active verb "stops". (See MPEP 2173.05(p)II). It is suggested to amend "and stops of" to –and is configured to stop- in ll. 11. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

24. Claim 1 recites the limitation "a second pump drive section that suctions" in ll. 14, making it a claim that is directed to neither a "process" nor a "machine". It is unclear if the claim is a product claim or a process claim due to the active verb "suctions". (See MPEP 2173.05(p)II). It is suggested to amend "that suctions" to –is configured to suction- in ll. 14. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

25. **Claim 1** recites the limitations “a command for stopping the high-frequency output control signal- in ll. 12-13 & 15-16. It is unclear if the “command” of ll. 15-16 is the same as or different from that of ll. 12-13. For purposes of examination, ll. 15-16 will be interpreted as –the command for stopping the high-frequency output control signal-.

26. **Claim 1** recites the limitation “a second pump drive section that …stops suction of the liquid” in ll. 16-17, making it a claim that is directed to neither a “process” nor a “machine”. It is unclear if the claim is a product claim or a process claim due to the active verb “stops”. (See MPEP 2173.05(p)II). It is suggested to amend “and stops” to –and is configured to stop- in ll. 16. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

27. **Claims 2-5 & 7** depend from claim 1 and are thus also rejected.

28. **Claim 2** recites the limitation “set/changed” in ll. 3. It is unclear if the claim is positively reciting -set and changed- or -set or changed- since the symbol "/" means "or" grammatically. For purposes of examination, the claim will be interpreted as -set or changed- in ll. 3.

29. **Claim 3** recites the limitation "the energy" in ll. 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the energy” to –the high-frequency current- in ll. 3

30. **Claim 3** recites the limitation "the first pump" in ll. 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the first pump” to –the first pump drive section- in ll. 3.

31. **Claim 4** recites the limitation "the energy" in ll. 2. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the energy” to –the high-frequency current- in ll. 3

32. **Claim 4** recites the limitation "the output of the energy" in ll. 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the output of the energy” to –the high-frequency current- in ll. 3

33. **Claim 4** recites the limitation “the energy control section stops the second pump” in ll. 3, making it a claim that is directed to neither a “process” nor a “machine”. It is unclear if the claim is a product claim or a process claim due to the active verb “stops”. (See MPEP 2173.05(p)II). It is suggested to amend “the energy control section stops the second pump” to –the energy control section is configured to stop the second pump drive section- in ll. 3. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

34. **Claim 4** recites the limitation "the second pump" in ll. 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the first pump” to –the second pump drive section- in ll. 3.

35. **Claim 5** recites the limitation “the energy control section performs control” in ll. 1-2, making it a claim that is directed to neither a “process” nor a “machine”. It is unclear if the claim is a product claim or a process claim due to the active verb “performs”. (See MPEP 2173.05(p)II). It is suggested to amend “the energy control performs control” to –the energy control section is configured to perform control- in ll. 1-2. The claim will be

interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

36. **Claim 5** recites the limitation "the second pump" in ll. 2, 3, & 5 (three times). There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the first pump” to –the second pump drive section- in ll. 2, 3, & 5.

37. **Claim 5** recites the limitation "the stoppage" in ll. 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the stoppage” to –stopping- in ll. 3

38. **Claim 5** recites the limitation "the output" in ll. 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested to amend “the output” to –the high-frequency current- in ll. 3

39. **Claim 5** recites the limitation "the pump" in ll. 4. There is insufficient antecedent basis for this limitation in the claim. It is also unclear which “pump” is being referred to: "the first pump drive section” or the “second pump drive section”. For purposes of examination, it will be interpreted as -the first pump drive section or the second pump drive section- in ll. 4.

40. **Claim 5** recites the limitation “supply of the liquid via the second pump” in ll. 4-5; however, claim 1, upon which claim 5 depends, recites the limitation "a first pump drive section that feeds the liquid...a second pump drive section that suctions the liquid". Thus, it is the first pump drive section that supplies the liquid, not the "second pump" as claimed in claim 5. It is unclear how the second pump can supply the liquid when it is aspirating the liquid. For purposes of examination, the claim will be interpreted as -the

pump is stopped after supply of the liquid for the predetermined period of time or in the predetermined amount--in ll. 4-5.

41. **Claim 7** recites the limitation "an impedance detection section that detects an impedance" in ll. 1-2, making it a claim that is directed to neither a "process" nor a "machine". It is unclear if the claim is a product claim or a process claim due to the active verb "detects". (See MPEP 2173.05(p)II). It is suggested to amend "an impedance detection section that detects an impedance" to –an impedance detection section that is configured to detect an impedance- in ll. 1-2. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

42. **Claim 7** recites the limitation "two pinching members that pinch the living tissue" in ll. 2-3, making it a claim that is directed to neither a "process" nor a "machine". It is unclear if the claim is a product claim or a process claim due to the active verb "pinch". (See MPEP 2173.05(p)II). It is suggested to amend "two pinching members that pinch the living tissue" to –two pinching members that are configured to pinch the living tissue- in ll. 2-3. The claim will be interpreted in the suggested manner. Please note corresponding 35 USC 101 rejection above.

Claim Rejections - 35 USC § 102

43. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

44. Claims 1 & 3-5 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Utley et al. (2006/0259029).

45. Concerning **claim 1**, as illustrated in Fig. 82, Utley et al. disclose **a surgical apparatus** (system 24; [0120]) **comprising:**

a treatment section for treating a living tissue (operative element 36; [0125]);

an energy generation section for providing high-frequency current to the treatment section (generator 38 supplies radiofrequency treatment energy; [0130]);

a liquid feeding conduit for feeding a liquid to the living tissue (fluid delivery apparatus 44 conveys processing fluid F through the lumen 98 for discharge at the treatment site; [0179]);

a suction conduit for suctioning the liquid (aspirating apparatus 46 conveys aspirated material from or near from the operative element 36 through lumen 102 for discharge; [0133], [0180]);

an energy control section that outputs a high-frequency output control signal for controlling the high-frequency current from the energy generation section (controller 52 governs the power levels, cycles, and duration of radio frequency energy as well as delivery of processing fluid, and if desired, the removal of aspirated material; [0135]);

a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output (fluid delivery apparatus 44

comprises an integrated pump 428 that is coupled to the I/O device 54; [0394-0395)**, in response to a command for an output of the high- frequency output control signal from the energy control section, and stops feeding of the liquid from the liquid feeding conduit, in response to a command for stopping the high- frequency output control signal** (when the foot pedal 416 is pressed, the controller 52 activates the pump rotor 428 and cooling liquid is conveyed through the treatment device TD into contact with mucosal tissue at the targeted site and after a preliminary time period, the controller 52 applies rf energy through the electrodes, and controller 52 terminates the conveyance of rf ablation energy and commands a flow of cooling liquid for a predetermined time after the energy is stopped; [0437-0438], [0451-0452])**; and**

a second pump drive section that suctions the liquid from the suction conduit (an additional dedicated pump rotor or equivalent pumping mechanism to perform the aspiration function; [0399]) **for a predetermined period of time or in a predetermined amount, in response to a command for stopping the high-frequency output control signal from the energy control section, and stops suction of the liquid from the suction conduit after the suction for the predetermined period of time or in the predetermined amount** (controller 52 terminates the conveyance of rf ablation energy and commands aspiration from the treatment device for a predetermined time after the energy is stopped in conjunction with the flow of cooling liquid; [0451-0452])**.**

The Examiner notes to Applicant that there is no requirement in the claims for the delivery of the cooling fluid to terminate at the same time as the energy.

The Examiner notes to Applicant that there is no requirement in the claims for the suctioning to only occur after termination of the energy.

46. Concerning **claim 3**, Utely et al. disclose the predetermined time to be set according to the period of time for driving the first pump (428) ([0451-0452]).

47. Concerning **claim 4**, Utely et al. disclose that the energy control section (52) stops the second pump after receiving the instruction to stop the output of energy ([0451-0452]; Fig. 82).

48. Concerning **claim 5**, Utely et al. disclose controlling the driving of the second suction pump to start when the high frequency energy is stopped, and stopping the second pump after the liquid has been supplied for the predetermined period of time ([0452]).

49. Claim 1 & 3-4 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Yachi et al. (2006/0265035).

50. Concerning **claim 1**, as illustrated in Fig. 40-41, Yachi et al. disclose **a surgical apparatus** (ultrasonic treatment apparatus 750; [0280]) **comprising:**

a treatment section for treating a living tissue (ultrasonic treatment instrument 751; [0283])**;**

an energy generation section for providing high-frequency current to the treatment section (a vibrator, not shown, of the ultrasonic suction treatment instrument 532 can be also connected to the ultrasonic generator 528 // or // high frequency power supply 527 can be connected to the ultrasonic treatment instrument 501 and the

ultrasonic suction treatment instrument 532, respectively, by a high frequency cable 541; [0221], [0224]);

a liquid feeding conduit for feeding a liquid to the living tissue (water supply unit 529 supplies fluid to water supply tube 531; [0208], [0222]);

a suction conduit for suctioning the liquid (suction unit 529 suctions from suction tube 542; [0222], [0224]);

an energy control section that outputs a high-frequency output control signal for controlling the high-frequency current from the energy generation section (control signal sent from control means 570 which is a control portion disposed in the ultrasonic generator 528 of the ultrasonic treatment apparatus 500 to the water supply/suction unit 529 and the insufflator 530 through the communication cable 538. That is, it is performed by operation control of the control means 570; [0235]);

a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high- frequency output control signal from the energy control section (first at Step S31, the ultrasonic vibration switch 535 is turned on and a sound signal is inputted. Then, at Step S22, by operation of the water supply/suction unit 529, it is determined whether a fluid of water is being supplied from the tip end opening portion 543 to the grip portion 5 and the probe 8; [0281]), **and stops feeding of the liquid from the liquid feeding conduit, in response to a command for stopping the high- frequency output control signal; and a second pump drive section that suctions the liquid from the suction conduit for a predetermined period of time or**

in a predetermined amount, in response to a command for stopping the high-frequency output control signal from the energy control section, and stops suction of the liquid from the suction conduit after the suction for the predetermined period of time or in the predetermined amount (the water supply /suction unit 529 and the insufflator 530 are operated for a preset time of several seconds and a fluid of water is supplied from the tip end opening portion to the grip portion 5 or the probe 8, while smoke, mist or the like is sucked from the trocar 790. Then, at Step S47, it is determined whether the time during which the fluid is supplied and sucked has reached the preset several seconds or not. Returning to Step S47, if the time during which the fluid of water is supplied/sucked has reached the preset several seconds, the routine goes onto Step S48, where the water supply /suction unit 529 and the insufflator 530 are stopped and then, the routine is finished; [0286-0288]).

51. Concerning **claim 3**, Yachi et al. disclose the predetermined period of time to be set according to the period of time for driving the first pump with the liquid ([0288]).

52. Concerning **claim 4**, Yachi et al. disclose that upon receipt of an instruction for generating energy (cycle of s50) after stopping energy (s42), the energy control section stops the second pump (248) ([0282], [0287]; Fig. 41).

Claim Rejections - 35 USC § 103

53. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been

> obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

54. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

55. Claim 2 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Yachi et al. (2006/0265035), as applied to claim 1, in further view of Kim et al. (2011/0040299).

56. Concerning **claim 2**, Yachi et al. disclose the predetermined period of time to be stored in a storage section pf generator (528) ([0235], [0243], [0246-0247]). Yachi et al. fail to disclose the predetermined period of time configured to be set or changed. However, Kim et al. disclose a surgical apparatus comprising a front panel (2305) of an energy control section (2301) that includes display and time set elements for various parameters of the surgical apparatus). At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the invention of Slater in view of Yachi et al. such that the predetermined period can be set or changed in order to

provide the benefit of user control on the input time parameters as taught by Kim et al. ([0034]; Fig. 1)

Conclusion

57. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: **Slater (5,417,709)** discloses an electrosurgical forceps with both aspirating and suctioning conduits; **Tadami (2010/0137751)** disclose an electrosurgical apparatus where suction is applied after energy is stopped for a predetermined amount of time, but fails to disclose a first pump section for feeding liquid.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAYMI DELLA whose telephone number is (571)270-1429. The examiner can normally be reached on M-Th 8:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda Dvorak can be reached on (571)272-4764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAYMI DELLA/
Primary Examiner, Art Unit 3739

Notice of References Cited	Application/Control No. 14/163,528	Applicant(s)/Patent Under Reexamination SANAI, HIDEO	
	Examiner JAYMI DELLA	Art Unit 3739	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,417,709 A	05-1995	Slater, Charles R.	606/205
*	B	US-2006/0265035 A1	11-2006	Yachi et al.	607/101
*	C	US-2006/0259029 A1	11-2006	Utley et al.	606/041
*	D	US-2010/0137751 A1	06-2010	Tadami, Yusuke	601/2
*	E	US-2011/0040299 A1	02-2011	Kim et al.	606/33
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	75	malecki.in. and suction$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 14:11
L2	2	(10/952492).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/29 14:12
L3	5	(("5417709") or ("20100137751") or ("20110040299") or ("20060265035") or ("20060259029")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/29 14:15
S1	56	sanai-hideo$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S2	8620	(olympus and medical and systems).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:33
S3	304	hatta-shinji$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S4	8	(S1 or S3) and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:34
S5	15	(S1 or S3) and (pump or pumping or pumped) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:35
S6	7	S5 not S4	US-PGPUB; USPAT;	OR	OFF	2015/04/07 20:35

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
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S8	193	S2 and (pump or pumping or pumped) and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:36
S9	9	(("20100137751") or ("20030040672") or ("20100324458") or ("20060265035") or ("6666860") or ("20100185196") or ("20030040672") or ("20100324458") or ("6306131") or ("20010032002") or ("20070156134")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/07 20:46
S10	290	a61b18/0206.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S11	1374	a61c1/07.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:52
S12	3466	a61f9/00745.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S13	294	a61f2013/15869.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:53
S14	1868	a61h23/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54

S15	190	a61h39/007.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:54
S16	1667	a61m11/005.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:55
S18	63	a61m2205/3693.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:56
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S22	2	"14163203"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:57
S23	30022	((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/002).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/07 20:58
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		or irrigating or irrigant or saline)	EPO; JPO; DERWENT; IBM_TDB			
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S26	527895	(pump or pumping or pumped) with (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38
S28	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:38
S29	827287	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (output or current or voltage or power or energy)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S30	881068	(pump or pumping or pumped) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
S31	283150	(stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) with (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:39
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S34	605	S26 and S28 and S29 and S30 and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 08:40
S35	235	S26 and S28 and S30 and (S31 same S29)	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/04/08 09:15

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S37	26	"9814131"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 10:25
S38	30	(fluid$assisted and electrocautery and device).ti.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 10:26
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			DERWENT; IBM_TDB			
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S48	242	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
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S50	1620869	high$frequency or hf or radio$frequency or rf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 14:23
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			USPAT; USOCR			15:06
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S56	213	("2397823" | "3019790" | "3980086" | "4646751" | "4750488" | "4763668" | "4880015" | "5016614" | "5123902" | "5131379" | "5141519" | "5152778" | "5195958" | "5197968" | "5209747" | "5217460" | "5224931" | "5286255" | "5300087" | "5312391").PN. OR ("5417709").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:13
S58	113	S56 and (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum) and (liquid or fluid or irrigation or irrigating or irrigant or saline)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 15:15
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S61	1	(10/206842).APP.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 15:26
S62	275280	((stop or stopping or stoppage or stopped or terminate or terminating or termination or terminated or discontinue or discontinued or discontinuing) near3 (energy or current or voltage or power)) with ((commence or commenced or commencing or start or started or starting or begin or beginning or begun or activate or activation or activating or activated) near3 (suction or suctioned or suctioning or aspirate or aspiration or aspirated or aspirating or vacuum or vacum)(output or current or voltage or power or energy))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:02
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			IBM_TDB			
S66	4478	((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:27
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		terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)).clm.				
S70	9	S67 and S69	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:28
S71	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:36
S72	45	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:37

		finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and (controller or micro$controller or processor or micro$processor or cpu or control$unit)				
S73	12	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:39
S74	1	("20080167645").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 16:41
S75	44	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/04/08 16:49

		aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and arthrocare.as. and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S76	697	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) same (suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and S67 and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/08 16:49

		pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))				
S77	3	(("8523850") or ("8523851") or ("8523852")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/08 17:18
S78	1	("20060259029").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/29 07:22
S79	2231	(((liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas) with (pump or pumping or pumped)) and ((suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum) with (pump or pumping or pumped)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (energy or current or voltage or power or output)) and ((terminate or termination or terminated or terminating or stop or stopping or stopped or de$activate or de$activation or de$activated or de$activating or end or ending or ended or cease or ceased or ceasing or cessation or finish or finished or finishing or conclude or concluded or concluding) with (liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas)) and (radio$frequency or rf or high$frequency or hf or electrosurgical)) and ((controller or micro$controller or processor or micro$processor or cpu or control$unit) with (pump or pumping or pumped or liquid or fluid or irrigate or irrigation or irrigant or irrigating or gas or suction or suctioning or suctioned or aspirate or aspirating or aspirated or aspiration or vacuum or vacum))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 09:25
S80	33909	(time or duration or minute or second) with (set or pre$set or input) with (suction or suctioned or suctioning or aspirate or aspirated or aspiration or aspirating or vacuum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 10:29
S81	18834	606/32-52.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2015/04/29 10:29

			IBM_TDB			
S82	60	S80 and S81	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 10:29
S83	1505	(time or duration or minute or second or amount or volume) with impedance with (suction or suctioned or suctioning or aspirate or aspirated or aspiration or aspirating or vacuum)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:22
S84	29	S81 and S83	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:22
S85	85847	a61b18$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S86	76075	a61b2018$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S87	97114	S85 or S86	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S88	36	S83 and S87	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:37
S89	108	((time or duration or minute or second or amount or volume) with impedance with (suction or suctioned or suctioning or aspirate or aspirated or aspiration or aspirating or vacuum)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/04/29 11:42
S90	5	(("20100137751") or ("20030040672") or ("20100324458") or ("20060265035") or ("6666860")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/29 12:51

EAST Search History (Interference)

< This search history is empty>

4/ 29/ 2015 2:16:07 PM
C:\ Users\ jdella\ Documents\ EAST\ Workspaces\ 14163528.wsp

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BIB DATA SHEET

CONFIRMATION NO. 1030

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/163,528	01/24/2014	606	3739	153190

APPLICANTS

OLYMPUS MEDICAL SYSTEMS CORP., Tokyo, JAPAN, Assignee (with 37 CFR 1.172 Interest);

INVENTORS

Hideo SANAI, Hachioji-shi, JAPAN;

**** CONTINUING DATA ***************************

This application is a CON of PCT/JP2013/060447 04/05/2013
which claims benefit of 61/636,269 04/20/2012 /JD/

**** FOREIGN APPLICATIONS *************************** None, /JD/

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

02/07/2014

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JAYMI E DELLA/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		JAPAN	1	7	1

ADDRESS

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850
UNITED STATES

TITLE

SURGICAL DEVICE

FILING FEE RECEIVED		
1740	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Receipt date: 01/24/2014

Modified Form PTO-1449 (REV. 07/09) PATENT & TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY DOCKET NO. 153190	APPLICATION NO. New U.S. Patent Application
	FIRST NAMED INVENTOR Hideo SANAI	
	FILING DATE January 24, 2014	

U.S. PATENT DOCUMENTS				
Examiner Initials	Cite No.	Document Number	Date	Name
	1	2010/0137751 A1	06/03/2010	Tadami
	2	2003/0040672 A1	02/27/2003	Ogura et al.
	3	2010/0324458 A1	12/23/2010	Okada et al.
	4	2006/0265035 A1	11/23/2006	Yachi et al.
	5	6,666,860 B1	12/23/2003	Takahashi

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Document Number	Date	Country	With English Abstract	With English Translation
	6	WO 98/14131 A1	04/09/1998	WIPO		
	7	JP-A-2006-341066	12/21/2006	JAPAN	X	X
	8	JP-A-2006-187668	07/20/2006	JAPAN	X	X
	9	JP-A-2001-501513	02/06/2001	JAPAN		X
	10	JP-A-2001-112768	04/24/2001	JAPAN	X	X

OTHER DOCUMENTS		
Examiner Initials	Cite No.	Including name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	11	International Search Report issued in International Application No. PCT/JP2013/060447 dated May 7, 2013 (with translation).

EXAMINER /Jaymi Della/	DATE CONSIDERED 04/07/2015

Examiner: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Date: January 21, 2015 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.D./

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14163528	SANAI, HIDEO
	Examiner	Art Unit
	JAYMI DELLA	3739

CPC- SEARCHED

Symbol	Date	Examiner
((A61B17/320092 OR A61B18/14 OR A61B18/1445 OR A61B2218/002 OR A61B2218/007).CPC.)	2015/04/07	JD
((A61B17/320092 OR A61B18/12 OR A61B18/1445 OR A61B2017/00026 OR A61B2018/00029 OR A61B2018/00684 OR A61B2018/00744 OR A61B2018/00761 OR A61B2018/00875 OR A61B2018/00994 OR A61B2217/007 OR A61B2218/0	2015/04/07	JD

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
see EAST search history	2015/04/29	JD

INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/JAYMI DELLA/ Primary Examiner.Art Unit 3739

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/163,528	01/24/2014	Hideo SANAI	153190	1030

25944 7590 11/07/2014

OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
DVORAK, LINDA C	

ART UNIT	PAPER NUMBER
3739	

NOTIFICATION DATE	DELIVERY MODE
11/07/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
jarmstrong@oliff.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
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Alexandria, VA 22313-1450
www.uspto.gov

In re Application of	: DECISION ON REQUEST TO
Hideo Sanai	: PARTICIPATE IN THE PATENT
Application No.: 14/163,528	: PROSECUTION HIGHWAY
Filed: 24 January 2014	: PROGRAM AND PETITION
Attorney Docket No.: 153190	: TO MAKE SPECIAL UNDER
For: SURGICAL DEVICE	: 37 CFR 1.102(a)

This is a decision on the request to participate in the Patent Prosecution Highway (PPH) program and the petition under 37 CFR 1.102(a), filed 30 July 2014, to make the above-identified application special.

The request and petition are **GRANTED**.

DISCUSSION

A grantable request to participate in the PPH pilot program and petition to make special require:

1. The U.S. application for which participation in the Global/IP5 PPH pilot program is requested must have the same earliest date, whether this is the priority date or filing date, as that of a corresponding national or regional application filed with another Global/IP5 PPH participating office or a corresponding PCT international application for which one of the Global/IP5 PPH participating offices was the International Searching Authority (ISA) or the International Preliminary Examining Authority (IPEA).

2. Applicant must:
    a. Ensure all the claims in the U.S. application must sufficiently correspond or be amended to sufficiently correspond to the allowable/patentable claim(s) in the corresponding Office of Earlier Examination (OEE) application and
    b. Submit a claims correspondence table in English;

3. Examination of the U.S. application has not begun;

4. Applicant must submit:
    a. Documentation of prior office action:
        i. a copy of the office action(s) just prior to the "Decision to Grant a Patent" from each of the Global/IP5 PPH participating office application(s) containing the allowable/patentable claim(s) or
        ii. if the allowable/patentable claims(s) are from a "Notification of Reasons for Refusal" then the Notification of Reasons for Refusal or

iii. if the Global/IP5 PPH participating office application is a first action allowance then no office action from the Global/IP5 PPH participating office is necessary should be indicated on the request/petition form or
iv. the latest work product in the international phase of the OEE PCT application;

b. An English language translation of the Global/IP5 PPH participating office action or work product from (4)(a)(i)-(ii) or (iv) above;

5. Applicant must submit:
   a. An IDS listing the documents cited by the Global/IP5 PPH participating office examiner in the Global/IP5 PPH participating office action or work product (unless already submitted in this application)
   b. Copies of the documents except U.S. patents or U.S. patent application publications (unless already submitted in this application);

The request to participate in the PPH pilot program and petition comply with the above requirements. Accordingly, the above-identified application has been accorded "special" status.

Telephone inquiries concerning this decision should be directed to the undersigned at (571) 272-3204. All other inquiries concerning the examination or status of the application is accessible in the PAIR system at http://www.uspto.gov/ebc.index.html.

This application will be forwarded to the examiner for action on the merits commensurate with this decision.

/SDB/

Sherry D. Brinkley
Paralegal Specialist
Office of Petitions

Office of Petitions: Decision Count Sheet

Mailing Month

Application No. 14163528

14163528

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: BRINKLEY, SHERRY

Count (1) - Palm Credit 14/163,528

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 652 - Petition to make special-PPH

652

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: *11/4/2014*

Office of Petitions: Routing Sheet

Application No.: 14/163,528

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application.

- [x] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014

For: SURGICAL DEVICE

Group Art Unit:

Examiner:

Docket No.: 153190

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Please consider the following:

Amendments to the Claims as reflected in the listing of claims;

Remarks.

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A surgical apparatus comprising:

a treatment section for treating a living tissue;

an energy generation section for providing high-frequency current to the treatment section;

a liquid feeding conduit for feeding a liquid to the living tissue;

a suction conduit for suctioning the liquid;

an energy control section that outputs a high-frequency output control signal for controlling the high-frequency current from the energy generation section;

a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal from the energy control section, and stops feeding of the liquid from the liquid feeding conduit, in response to a command for stopping the high-frequency output control signal; and

a second pump drive section that suctions the liquid from the suction conduit for a predetermined period of time or in a predetermined amount, in response to a command for stopping the high-frequency output control signal from the energy control section, and stops suction of the liquid from the suction conduit after the suction for the predetermined period of time or in the predetermined amount.

2. (Original) The surgical apparatus according to claim 1, wherein the predetermined period of time or the predetermined amount is stored in a storage section and can be set/changed.

3. (Original) The surgical apparatus according to claim 1, wherein the predetermined period of time or the predetermined amount is set according to a period of time of outputting the energy or a period of time of driving the first pump.

4. (Original) The surgical apparatus according to claim 1, wherein upon receipt of an instruction for generating the energy to the energy generation section after stoppage of the output of the energy, the energy control section stops the second pump.

5. (Original) The surgical apparatus according to claim 1, wherein the energy control section performs control so that driving of the second pump is started so as to perform suction of the liquid via the second pump, in response to the stoppage of the output of the high-frequency output control signal, and the pump is stopped after supply of the liquid via the second pump for the predetermined period of time or in the predetermined amount.

6. (Canceled)

7. (Original) The surgical apparatus according to claim 1, comprising an impedance detection section that detects an impedance between two pinching members that pinch the living tissue in the treatment section,

wherein the predetermined period of time or the predetermined amount varies according to the impedance detected by the impedance detection section.

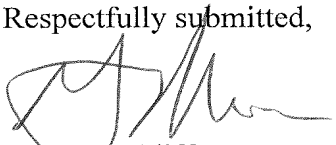
REMARKS

Claims 1-5 and 7 are pending in this application. By this Amendment, claim 6 is cancelled. No new matter is added.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

B. Graham Nelson
Registration No. 72,699

JAO:BGN/dlh

Date: July 30, 2014

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Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

Electronic Acknowledgement Receipt

EFS ID:	19727213
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	Linda Marie Saltiel/Dustin Halas
Filer Authorized By:	Linda Marie Saltiel
Attorney Docket Number:	153190
Receipt Date:	30-JUL-2014
Filing Date:	24-JAN-2014
Time Stamp:	14:20:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition to make special under Patent Prosecution Hwy	153190pph.pdf	340581 64189251ecc5f046395e97f9c4fd91c6478c205a	no	3

Warnings:	
Information:	

2	Petition to make special under Patent Prosecution Hwy	153190OA.pdf	340284 d9a38b5c852876a3822c002b8cf236ad31a83ba4	no	5
Warnings:					
Information:					
3		153190prelim.pdf	240969 879c7bd8372c21d330be68ebcbecc32146f7f31d	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	3
	Applicant Arguments/Remarks Made in an Amendment	4	4

Warnings:	
Information:	
Total Files Size (in bytes):	921834

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

VERIFICATION OF TRANSLATION

The undersigned, residing at Musashi Bldg. 4-4, Nishishinjuku 7-chome, Shinjuku-ku, Tokyo, Japan,

Japanese Patent Application No. 2013-558264

declares:

1) that I know well both the Japanese and English Languages;

2) that I translated the Office Action from Japanese to English;

3) that the attached English translation is a true and correct translation of the Office Action of the above-identified Japanese Application to the best of my knowledge and belief; and

4) that all statements made of my own knowledge are true and that all statements made on information and belief are with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that such false statements may jeopardize the validity of the application or any patent issuing thereof.

Signature of translator Kenji Matsumoto

Kenji MATSUMOTO

Dated: July 10, 2014

Mailing Number: 099417
Mail Date: February 25, 2014

Office Action (Notice of Examiner's Reasons for Rejection)

Japanese Patent Application No. 2013-558264
Drafting date: February 17, 2014
Examiner in JPO: Satoshi MURAKAMI 9424 3I00
Attorneys of Applicant of Patent Application: Mr. Susumu ITOH (and two others)
Applied Article(s): Article 36

This application shall be rejected by the reasons mentioned below. If the applicant should have any arguments against this, the applicant is advised to file the same within sixty days from the mail date of this notice.

Reason

The subject application includes claims for patent which do not comply with the requirement provided in Article 36, paragraph 6, item 2 of Japanese Patent Law in the points noted below.

Note

In claim 6, inclusion of an operating handle is recited but it is unclear what is operated by the operating handle, which renders the invention indefinite. For example, there is a question that it is not technically held except a case where the operating handle generates energy. Further, claim 6 refers to claim 1 and as a result claim 6 renders the invention indefinite. That is, when the recitation of claim 1 is normally interpreted, it is interpreted that the second pump is driven upon receiving a command for stopping the high-frequency output control signal, and it is not deemed that the second pump is driven in response to an energy output, intended by claim 6 and shown in the second embodiment. Furthermore, in the case where the second pump is driven upon receiving the command for stopping the high-frequency output control signal, the liquid suction restricting mechanism is unnecessary and technically indefinite.

Thus, the invention according to claim 6 is not clear.

<Claims for which reason for rejection is not found>

No reason for rejection is found for the inventions defined in claims 1through 5 and 7 at present. If a reason for rejection is newly found, the reason for rejection

will be notified.

Record of the prior art document search

- Searched Field IPC A61B 18/00
- Prior Art Documents

  Japanese Patent Application Laid-Open Publication No. 2006-341066

  Japanese Patent Application Laid-Open Publication No. 2006-187668

This record of the result of prior art document search does not constitute reasons for rejection.

If the applicant should have any inquiry in connection with the contents of this notice or wish to conduct an interview thereon, please contact the following.

Patent Examination Section, 2nd Division, Welfare Service Apparatus (Therapeutic Apparatus) Satoshi MURAKAMI

TEL. 03 (3581) 1101 Extension 3346

FAX. 03 (3501) 0672

拒絶理由通知書

特許出願の番号	特願２０１３－５５８２６４	
起案日	平成２６年　２月１７日	
特許庁審査官	村上　聡	９４２４　３Ｉ００
特許出願人代理人	伊藤　進（外　２名）　様	
適用条文	第３６条	

この出願は、次の理由によって拒絶をすべきものです。これについて意見がありましたら、この通知書の発送の日から６０日以内に意見書を提出してください。

理　由

この出願は、特許請求の範囲の記載が下記の点で、特許法第３６条第６項第２号に規定する要件を満たしていない。

記

請求項６に、操作ハンドルを有することが記載されているが、この操作ハンドルが何を操作するハンドルであるのか不明であり発明を不明確にしている。例えば、操作ハンドルがエネルギーを発生させるもの以外の場合には、技術的に成立しないのではないか。さらに、請求項６は、請求項１を引用している結果、発明を不明確にしている。つまり、請求項１の記載を通常に解すれば、高周波出力制御信号の停止命令を受けて第２のポンプが駆動されるものと解され、請求項６が意図している第２の実施の形態にあるような、エネルギー出力に応じて第２のポンプを駆動させるようなものとは認められない。また、高周波出力制御信号の停止命令を受けて第２のポンプが駆動されるものの場合、流体吸引規制機構は不要となり技術的に不明確になる。

よって、請求項６に係る発明は明確でない。

＜拒絶の理由を発見しない請求項＞

請求項１ないし５、７に係る発明については、現時点では、拒絶の理由を発見しない。拒絶の理由が新たに発見された場合には拒絶の理由が通知される。

先行技術文献調査結果の記録

・調査した分野　　ＩＰＣ　Ａ６１Ｂ１８／００
・先行技術文献　　特開２００６－３４１０６６号公報
　　特開２００６－１８７６６８号公報

この先行技術文献調査結果の記録は、拒絶理由を構成するものではありません。

－－

この拒絶理由通知の内容に関するお問い合わせ、または面接のご希望がございましたら下記までご連絡下さい。

審査第二部福祉サービス機器（治療機器）　村上　聡
ＴＥＬ．０３（３５８１）１１０１　内線３３４６
ＦＡＸ．０３（３５０１）０６７２

PTO/SB/20GLBL (01-14)
Approved for use through 01/31/2015. OMB 0651-0058
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE

REQUEST FOR PARTICIPATION IN THE GLOBAL/IP5 PATENT PROSECUTION HIGHWAY (PPH) PILOT PROGRAM IN THE USPTO

Application No.:	14/163,528	First Named Inventor:	Hideo SANAI
Filing Date:	January 24, 2014	Attorney Docket No.:	153190
Title of the Invention:	SURGICAL DEVICE		

THIS REQUEST FOR PARTICIPATION IN THE PPH PILOT PROGRAM ALONG WITH THE REQUIRED DOCUMENTS MUST BE SUBMITTED VIA EFS-WEB. INFORMATION REGARDING EFS-WEB IS AVAILABLE AT HTTP://WWW.USPTO.GOV/PATENTS/PROCESS/FILE/EFS/.

APPLICANT HEREBY REQUESTS PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PILOT PROGRAM AND PETITIONS TO MAKE THE ABOVE-IDENTIFIED APPLICATION SPECIAL UNDER THE PPH PILOT PROGRAM.

Office of earlier examination (OEE): Japan (Japan Patent Office)

OEE application number: JP 2013-558264 (JP 2013-558264 is Nat'l Stage of a PCT which claims priority to U.S. PROV 61/636,269, and U.S. 14/163,528 is continuation of that PCT)

Both the OEE application and the above-identified U.S. application have the following earliest date (filing or priority date): April 20, 2012 (filing date of U.S. PROV 61/636,269)

Type of OEE work product relied upon: Decision to grant a patent

Mailing date of OEE work product: June 3, 2014

I. Required Documents:

a. **A copy of the most recent office action prior to the decision to grant a patent or the most recent PCT work product (along with an English translation, if not in the English language):**

- ☒ is attached.
- ☐ is already present in the U.S. application.
- ☐ is not attached because it is available to the USPTO via the Dossier Access System or WIPO's PATENTSCOPE system.
- ☐ is not attached because the decision to grant a patent was the first office action.

b. **(1) An information disclosure statement listing the documents cited in the OEE work product:**

- ☐ is attached.
- ☒ has already been filed in the U.S. application.
- ☐ is not attached because no references were cited in the document in section a. above.

(2) Copies of all cited documents (except for U.S. patents or U.S. patent application publications)

- ☐ are attached.
- ☒ have already been filed in the U.S. application.
- ☐ are not attached because no references were cited in the document in section a. above.

PTO/SB/20GLBL (01-14)
Approved for use through 01/31/2015. OMB 0651-0058
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE

REQUEST FOR PARTICIPATION IN THE GLOBAL/IP5 PPH PILOT PROGRAM IN THE USPTO
(continued)

Application No.:	14/163,528	First Named Inventor:	Hideo SANAI

II. Claims Correspondence Table:

Claims in US Application	Patentable Claims in OEE Application	Explanation regarding the correspondence
1	1	US Claim 1 sufficiently corresponds to JP Claim 1.
2	2	US Claim 2 sufficiently corresponds to JP Claim 2.
3	3	US Claim 3 sufficiently corresponds to JP Claim 3.
4	4	US Claim 4 sufficiently corresponds to JP Claim 4.
5	5	US Claim 5 sufficiently corresponds to JP Claim 5.
7	6	US Claim 7 sufficiently corresponds to JP Claim 6.

III. All the claims in the US application sufficiently correspond to the patentable/allowable claims in the OEE application.

Signature	Date July 30, 2014
Name (Print/Typed) B. Graham Nelson	Registration Number 72,699

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
14/163,528	01/24/2014	

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **07/30/2014**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 6	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/VERONICA DAY EVERETT/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/163,528	01/24/2014	Hideo SANAI	153190

CONFIRMATION NO. 1030

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

PUBLICATION NOTICE

OC000000069514460

Title:SURGICAL DEVICE

Publication No.US-2014-0194871-A1
Publication Date:07/10/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/163,528

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	7 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
			TOTAL			TOTAL	1600

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/163,528	01/24/2014		1740	153190	7	1

CONFIRMATION NO. 1030

UPDATED FILING RECEIPT

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC000000067492070

Date Mailed: 04/03/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Hideo SANAI, Hachioji-shi, JAPAN;

Applicant(s)

OLYMPUS MEDICAL SYSTEMS CORP., Tokyo, JAPAN

Assignment For Published Patent Application

OLYMPUS MEDICAL SYSTEMS CORP., Tokyo, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 25944

Domestic Priority data as claimed by applicant

This application is a CON of PCT/JP2013/060447 04/05/2013
which claims benefit of 61/636,269 04/20/2012

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 02/07/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/163,528**
Projected Publication Date: 07/10/2014
Non-Publication Request: No

Early Publication Request: No
Title

SURGICAL DEVICE

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Attn: **Mail Stop Missing Parts**

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014 Docket No.: 153190

For: SURGICAL DEVICE

RESPONSE TO NOTICE TO FILE MISSING PARTS WITH TRANSLATION INCLUDING DRAWINGS AND CONFIRMATION OF SUBMISSION OF TRANSLATION OF PROVISIONAL APPLICATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the Notice to File Missing Parts of Application - Filing Date Granted (copy attached) mailed on February 10, 2014, submitted herewith is a translation of the application including drawings. Upon information and belief, the translation is an accurate English translation of the application as filed.

☒ A preliminary amendment is also attached.

	(Column 1)	(Column 2)	(Column 3)	SMALL ENTITY			OTHER THAN A SMALL ENTITY	
	CLAIMS REMAINING AFTER TRANSLATION AND ANY PRELIMINARY AMENDMENT	HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADD'L FEE	OR	RATE	ADD'L FEE
TOTAL CLAIMS	*7 MINUS	**20	=0	x 40 =	$		x 80 =	$
INDEP CLAIMS	*1 MINUS	***3	=0	x 210 =	$		x 420 =	$
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				+390 =	$	OR	+ 780 =	$
					$			$

†round up to next integer

* If the entry in Column 1 is less than the entry in Column 2, write "0" in Column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, write "20" in this space.

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, write "3" in this space.

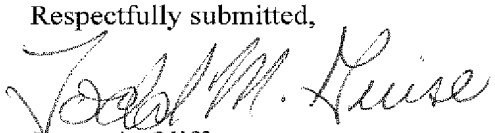
The "Highest Number Previously Paid For" in this space (Total or Independent) is the highest number found from the equivalent box in Column 1 of a prior Amendment or the number of claims originally filed.

Please charge my Deposit Account No. 15-0461 in the amount of ☒ $140.00 for the fee under 37 C.F.R. §1.17(i) and any excess claim fees noted above.

Entry of these documents should complete all of the filing formalities and fully satisfy all requirements of the Notice to File Missing Parts. Examination and allowance of this application in due course are respectfully solicited.

The Commissioner is hereby authorized to charge any additional fee (or credit any overpayment) associated for this filing to Deposit Account No. 15-0461.

Respectfully submitted,



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JAO:TMG/OZH/jxr

Date: March 24, 2014

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/163,528	01/24/2014	Hideo SANAI	153190

CONFIRMATION NO. 1030

FORMALITIES LETTER

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC000000066528897

Date Mailed: 02/10/2014

MISSING PARTS

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

DUE DATE
APR 10 2014

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The application was filed in a language other than English. Applicant is required to provide an English translation of the specification, a statement that the translation is accurate, and the processing fee set forth in 37 CFR 1.17(i). (See 37 CFR 1.52(d)).
- The above-identified nonprovisional application is claiming the benefit of a prior-filed provisional application that is in a non-English language. Pursuant to 37 CFR 1.78(a)(5), applicant is required to file:

  1. In the prior-filed provisional application, an English language translation of the prior-filed provisional application and a statement that the translation is accurate; and

  2. In the above-identified nonprovisional application, a confirmation that the translation and statement have been filed in the prior-filed provisional application.

  To avoid abandonment of the above-identified nonprovisional application, applicant is required to file these items within the time period set forth in this notice, unless applicant files a corrected application data sheet in compliance with 37 CFR 1.76 and, if appropriate, an amendment to the specification, to delete the benefit claim within the time period. Please note that once applicant deletes the benefit claim to the prior-filed provisional application, the Office will not accept any resubmission of the benefit claim.

  Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.
- Applicant must file an English translation of the application, the $ 140 fee set forth in 37 CFR 1.17(i), unless previously submitted, and a statement that the translation is accurate (37 CFR 1.52(d)).

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are:

DOCKETED
By VJO on 2/10 2014
and
By TMP on 2/10 2014
Oliff

- $ **140** English translation surcharge.
- $(**.00**) Previous Payment Amount.
- $ **140** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

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P.O. Box 1450
Alexandria VA 22313-1450

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/ebanaybanay/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014 Docket No.: 153190

For: SURGICAL DEVICE

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Please consider the following:

Amendments to the Specification; and

Remarks.

Amendments to the Specification:

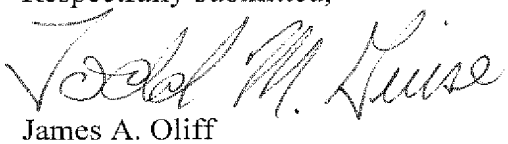
Please replace the Abstract with the attached substitute Abstract.

REMARKS

Claims 1-7 are pending in this application. By this Amendment, the Abstract is substituted. No new matter is added.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
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Olga Hernandez
Registration No. 58,232

JAO:TMG/OZH/jxr

Attachment:
Substitute Abstract

Date: March 24, 2014

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ABSTRACT

A surgical apparatus includes: a treatment section treating a living tissue; an energy generation section providing high-frequency current to the treatment section; a liquid feeding conduit feeding a liquid to the living tissue; a suction conduit suctioning the liquid; an energy control section that outputs a high-frequency output control signal for controlling the energy generation section; a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output, according to a command of the high-frequency output control signal, and stops feeding of the liquid, according to a command of the high-frequency output control signal; and a second pump drive section that suctions the liquid from the suction conduit for a predetermined period of time or in a predetermined amount, according to a command for stopping the high-frequency output control signal, and stops suction of the liquid after the suction.

SURGICAL APPARATUS

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation application of PCT/JP2013/060447 filed on April 5, 2013 and claims benefit of U.S. Provisional Patent Application No. 61/636,269 filed in the U.S.A. on April 20, 2012, the entire contents of which are incorporated herein by this reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a surgical apparatus, and specifically relates to a surgical apparatus that can output high-frequency current.

2. Description of the Related Art

Surgical treatment instruments are used for treatments such as coagulation or dissection of a living tissue in surgical operations. Among the surgical treatment instruments, there are those of a type that pinches or comes into contact with a living tissue to perform treatment (what is called a "scissors shape" or a "scoop shape" type). Also, as surgical treatment instruments, for example, high-frequency treatment instruments that can output high-frequency current have been known. As surgical treatment instruments, for example, ultrasound treatment instruments that can output ultrasound vibration, and high-frequency treatment instruments that can output high-frequency current, and furthermore, in recent years, energy treatment instruments that can simultaneously output ultrasound vibration and high-frequency current have been known.

In a scissors shape-type ultrasound treatment instrument, one of the members performs ultrasound vibration, and the other jaw member is opened/closed relative to the one member for pinching. Also, a scissors shape-type high-frequency treatment instrument provides a bipolar output of high-frequency current using two members.

There are cases where such treatment instrument is used to provide treatment using a high-frequency output while dripping saline. For example, in order to stop oozing bleeding in the parenchyma of a liver, that is, in order to stop the flow of blood oozing over a board area, a high-frequency output is provided while saline is dripped. Providing a high-frequency output with the oozing bleeding area immersed in saline enables a treatment to stop the oozing bleeding to be provided over the broad area. When such treatment to stop oozing bleeding is provided, a puddle of saline is formed inside the body, and thus, an assistant suctions the accumulated saline using a suction tube.

Also, the specifications of US Patent Application Laid-Open Publication Nos. US2010/137751A1, US2003/0040672A1 and US2010/0324458A1 each disclose a surgical apparatus that supplies a liquid to a treatment instrument and suctions the liquid during treatment.

SUMMARY OF THE INVENTION

A surgical apparatus according to an aspect of the present invention includes: a treatment section for treating a living tissue; an energy generation section for providing high-frequency current to the treatment section; a liquid feeding conduit for feeding a liquid to the living tissue; a suction conduit for suctioning the liquid; an energy control section that outputs a high-frequency output control signal for controlling the high-frequency current from the energy generation section; a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal from the energy control section, and stops feeding of the liquid from the liquid feeding conduit, in response to a command for stopping the high-frequency output control signal; and a second pump drive section that suctions the liquid from the suction conduit for a predetermined period of time or in a predetermined amount, in response to a command for stopping the high-frequency output control signal from the energy control section, and stops suction of the liquid

from the suction conduit after the suction for the predetermined period of time or in the predetermined amount.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram for describing a configuration of a surgical apparatus according to a first embodiment of the present invention;

Fig. 2 is a block diagram illustrating configurations of a power supply unit 12, a liquid feeding unit 13 and a suction unit 14 according to the first embodiment of the present invention;

Fig. 3 is a diagram indicating a relationship between a high-frequency output time period To and a suction time period Ts, which is stored in a storage section 42, according to the first embodiment of the present invention;

Fig. 4 is a flowchart illustrating an example of processing performed by a CPU 41 that controls an HF output section 44 and pump drive sections 46 and 48, according to the first embodiment of the present invention;

Fig. 5 is a flowchart illustrating an example of processing performed by the CPU 41 that controls the HF output section 44 and the pump drive sections 46 and 48, according to the first embodiment of the present invention;

Fig. 6 is a timing chart of an output signal EOUT for a high-frequency current output and pump drive signals PiOUT and PsOUT for pumps 47 and 49 according to the first embodiment of the present invention;

Fig. 7 is a diagram for describing a configuration of a surgical apparatus 1A according to a second embodiment of the present invention;

Fig. 8 is a flowchart illustrating an example of processing performed by a CPU 41 that controls an HF output section 44 and pump drive sections 46 and 48 according to the second embodiment of the present invention;

Fig. 9 is a flowchart illustrating an example of processing performed by the CPU 41 that controls the HF output section 44 and the pump drive sections 46 and 48 according to the second embodiment of the present invention; and

Fig. 10 is a timing chart of an output signal EOUT for a high-frequency current output, a pump drive signal PiOUT for a pump 47, a pump drive signal PsOUT for a pump 49, and saline suction from an opening portion 21c, according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will be described below by means of embodiments.

(First Embodiment)

Fig. 1 is a diagram for describing a configuration of a surgical apparatus according to a first embodiment of the present invention. As illustrated in Fig. 1, a surgical apparatus 1 includes a treatment instrument 11, a power supply unit 12, a liquid feeding unit 13 and a suction unit 14.

The treatment instrument 11 is a scissors shape-type surgical treatment instrument that can output at least either ultrasound vibration energy or high-frequency current energy. The treatment instrument 11 includes a treatment unit 21, a handle unit 22, a transducer unit 23, a signal cable 24 and a liquid feeding tube 25.

The treatment unit 21 includes a treatment section 31 for treating a living tissue, and an elongated sheath portion 32. The treatment section 31 includes a probe 31a, and a movable member 31b, which is a jaw member. The sheath portion 32 is a cylindrical member, and a shaft member or the like for opening/closing the probe 31a and the movable member 31b relative to each other is inserted inside the sheath portion 32. The movable member 31b can pivot with a pin 32a as a pivot axis, the pin 32a being provided at a distal end of the sheath portion 32, according to a motion of the shaft member or the like by an operation of the handle unit 22. Accordingly, a distal end portion of the probe 31a and the movable member 31b form a pinching portion that pinches a living tissue.

Furthermore, at a distal end portion of the treatment unit 21, an opening portion 21a for feeding saline is provided, and the opening portion 21a is connected to a tube 21b inserted inside the sheath portion 32. As indicated by dotted arrow a in Fig. 1, the opening portion 21a and a tube 12b are disposed so that saline is fed

and dripped toward a pinching part between the probe 31a and the movable member 31b in the treatment section 31. Accordingly, the opening portion 21a is a liquid feeding port provided in the treatment section 31, for feeding saline from the tube 21b, which is a liquid feeding conduit, between a living tissue and the treatment section 31.

A proximal end portion of the tube 21b inserted also inside the handle unit 22 is connected to the liquid feeding tube 25, whereby the tube 21b and the liquid feeding tube 25 are in communication with each other. As described later, the treatment instrument 11 is configured so that saline, which is a liquid fed from the liquid feeding unit 13, can pass through the liquid feeding tube 25 and the tube 21b and be ejected from the opening portion 21a. Accordingly, the liquid feeding tube 25 and the tube 21b form a liquid feeding conduit for feeding saline.

Also, at the distal end portion of the treatment unit 21, an opening portion 21c for suctioning saline is provided, and the opening portion 21c is connected to a tube 21d inserted inside the sheath portion 32. A proximal end portion of the tube 21d inserted also inside the handle unit 22 is connected to a suction tube 26, whereby the tube 21d and the suction tube 26 are in communication with each other. As described later, the treatment instrument 11 is configured so that saline can be suctioned from the opening portion 21c via the suction tube 26 and the tube 21d by the suction unit 14. Accordingly, the suction tube 26 and the tube 21d form a suction conduit for suctioning saline.

The opening portion 21a is a liquid feeding port provided in the treatment section 31, for feeding saline from the tube 21b, which is included in the liquid feeding conduit. The opening portion 21c is a suction port provided in the treatment section 31, for suctioning saline into the tube 21d, which is included in the suction conduit.

The handle unit 22 includes a rotating knob 35 on a distal end side of a cylindrical body portion 34. A surgeon can change an orientation of the probe 31a in the treatment section 31 by rotating the rotating knob 35 around an axis of the body portion 34.

A transducer unit 23 is attached to a proximal end portion of the body portion 34. The transducer unit 23 is connected to the probe 31a. The transducer unit 23 includes an ultrasound transducer (not illustrated) inside, which enables the probe 31a to perform ultrasound vibration.

The body portion 34 includes a handle portion 36, and the handle portion 36 includes a fixed handle 36a and a movable handle 36b. The handle portion 36 is an operating handle for pinching a living tissue. When a surgeon operates the movable handle 36b so as to come close to the fixed handle 36a, that is, close the handle portion 36, the movable member 31b in the treatment section 31 pivots, enabling a living tissue to be pinched between the probe 31a and the movable member 31b.

Furthermore, in the body portion 34, a plurality of switches 37 for output operation are provided. Accordingly, the surgeon turns on relevant one(s) of the switches 37 while grasping the handle portion 36 with a living tissue pinched between the distal end portion of the probe 31a and the movable member 31b in the treatment section 31, whereby treatment using an ultrasound vibration output, a high-frequency current output or a simultaneous output of ultrasound vibration and high-frequency current can be provided.

The power supply unit 12 is a control apparatus, and as described later, includes a control section, and performs control of ultrasound vibration output and high-frequency current output, and liquid feeding and suction according to operations of the switches 37 by the surgeon.

The liquid feeding unit 13 is connected to the power supply unit 12 via a signal cable 13a. Also, the liquid feeding unit 13 is connected to the treatment instrument 11 via the liquid feeding tube 25 for liquid feeding, enabling saline to be fed from the liquid feeding unit 13 to the treatment instrument 11.

The suction unit 14 is connected to the power supply unit 12 via a signal cable 14a. Also, the suction unit 14 is connected to the treatment instrument 11 via the suction tube 26 for suction, enabling saline to be suctioned from the opening portion 21c by the suction unit 14.

Fig. 2 is a block diagram illustrating configurations of the power supply unit 12, the liquid feeding unit 13 and the suction unit 14. The power supply unit 12 is a control apparatus that controls energy output of the treatment instrument 11. The power supply unit 12 includes an operating panel 40, which serves as an operating/setting section, a central processing unit (hereinafter referred to as "CPU") 41, which serves as a control section, a storage section 42, an ultrasound output section (hereinafter referred to as "US output section") 43 that outputs a drive signal for driving the transducer unit 23 for ultrasound vibration output, a high-frequency output section (hereinafter referred to as an "HF output section") 44 that outputs a high-frequency current signal for high-frequency current output, and an impedance detection section 45.

As described above, the CPU 41 controls an ultrasound vibration output, a high-frequency current output or a simultaneous output of ultrasound vibration and high-frequency current. The control is performed by the CPU 41 executing a control program stored in the storage section 42.

The storage section 42 includes, e.g., a ROM that stores the control program, a RAM that serves as a working memory area at the time of execution of the program, and a nonvolatile rewritable memory that stores information on liquid feeding time periods, which will be described later.

The US output section 43 outputs a drive signal for making the probe 31a perform ultrasound vibration, to the treatment instrument 11 via the signal cable 24 based on an ultrasound output control signal from the CPU 41.

The HF output section 44 outputs a high-frequency current signal for supplying a bipolar high-frequency output to the treatment section 31, to the treatment instrument 11 via the signal cable 24 based on a high-frequency output control signal from the CPU 41.

Accordingly, the US output section 43 and the HF output section 44 are energy generation sections that generate energy for providing ultrasound vibration and high-frequency current to the treatment section 31, respectively.

The impedance detection section 45 is a circuit for detecting an impedance of a living tissue pinched between the probe 31a and the movable member 31b. In other words, the impedance detection section 45 detects an impedance between two pinching members that pinch a living tissue in the treatment section 31. The impedance detection section 45 supplies a detection signal according to the impedance between the probe 31a and the movable member 31b, to the CPU 41.

Operating signals from the switches 37 are also inputted to the CPU 41. Note that here, as described later, an instruction for an energy output is provided by operation of a relevant one of the switches 37 by the surgeon; however, such energy output instruction may be provided via, e.g., a foot switch.

The liquid feeding unit 13 includes a pump drive section 46 and a pump 47. The pump drive section 46 is a drive circuit that outputs a drive signal for driving the pump 47, based on a pump drive signal from the CPU 41 via the signal cable 13a. The pump 47, which serves as a first pump, is connected to a non-illustrated tank, and is driven based on a drive signal from the pump drive section 46 and supplies saline retained in the tank to the tube 25. Performance of discharge by the pump 47 is, for example, 20 ml/min. In other words, the pump 47 is a pump for supplying saline to the liquid feeding conduit in order to feed a liquid of saline from the opening portion 21a, which is a liquid feeding port.

The suction unit 14 includes a pump drive section 48 and a pump 49. The pump drive section 48 is a drive circuit that outputs a drive signal for driving the pump 49 based on a pump drive signal from the CPU 41 via the signal cable 14a. The pump 49, which serves as a second pump, is connected to a non-illustrated tank, is driven based on a drive signal from the pump drive section 48, and discharges saline suctioned via the tube 26 to the tank (not illustrated). Performance of suction by the pump 49 is, for example, 20 ml/min. In other words, the pump 49 is a pump for suctioning a liquid of saline from the opening portion 21c, which is a suction port, via the suction conduit.

The CPU 41 controls the US output section 43 and the HF output section 44 and also controls the pump drive sections 46 and 48, according to operating signals from the switches 37.

In the storage section 42, later-described data on suction time periods for suction of saline by the pump 49, which are set in advance, is stored.

Fig. 3 is a diagram indicating a relationship between high-frequency output time period To and suction time period Ts, which is stored in the storage section 42. Since high-frequency output and driving of the liquid feeding pump 47 are linked to each other, the suction time period Ts is proportional to the high-frequency output time period To. Accordingly, the suction time period Ts relative to the high-frequency output time period To is set in advance so that as the high-frequency output time period To increases, the suction time period Ts is longer, and stored in the storage section 42. The suction time period Ts according to the high-frequency output time period To is stored in the form of, for example, table data in the storage section 42. As described later, the high-frequency output time period To is equal to a period of time of driving the pump 47.

Note that the suction time period Ts according to the high-frequency output time period To can be set/changed by, e.g., a surgeon via the operating panel 40 in the power supply unit 12 according to a difference in performance between the pumps 47 and 49 and a demand from the surgeon.

In other words, for the suction time period Ts, a period of time necessary for removing saline fed for energy-used treatment by means of suction of the saline is set.

Note that in Fig. 3, the suction time period Ts is set so as to increase in linear proportion to the high-frequency output time period To; however, as indicated by the alternate long and short dash line, the suction time period Ts may be set so as to increase in a stepwise manner.

Figs. 4 and 5 are flowcharts illustrating an example of processing performed by the CPU 41 that controls the HF output section 44 and the pump drive sections 46 and 48. Fig. 6 is a timing chart of an output signal EOUT for a high-frequency current output and pump drive signals PiOUT and PsOUT for the pumps 47 and 49.

The processing in Fig. 4 is processing performed by the CPU 41 when a relevant one of the switches 37 is depressed and hereby turned on to provide an instruction for an energy output of high-frequency current.

Upon receipt of an instruction for an energy output provided by depression of a relevant one of the switches 37, the CPU 41 provides an energy output designated by the instruction (S1). If the energy output is a high-frequency current output, the HF output section 44 is driven so as to provide a predetermined or designated output. Simultaneously with the energy output, the CPU 41 outputs a pump drive signal PiOUT to the pump drive section 46 to drive the liquid feeding pump 47 (S2). In Fig. 6, an output signal EOUT becomes high at a time t1, whereby energy output and liquid feeding are started.

The CPU 41 starts time measurement using, e.g., a software counter, simultaneously with the energy output, to measure a period of time of the output of the high-frequency current (S3).

Then, the CPU 41 determines whether or not the switch 37 is turned off, that is, the energy output is stopped (S4), and if the energy output is not stopped (S4: NO), the processing returns to S1. If the energy output is stopped (S4: YES), the CPU 41 stops the measurement of the output time period (S5), and stops the output of the pump drive signal PiOUT to stop the liquid feeding pump 47 (S6).

Then, the CPU 41 calculates a period of time of the energy output from a count value of the counter for output time period measurement, and reads a suction time period Ts stored in the storage section 42 based on the calculated output time period To (S7). For example, in Fig. 3, if the output time period To is to1, a value ts1 of the suction time period Ts is read.

The CPU 41 outputs a pump drive signal PsOUT to the pump drive section 48 to drive the pump 49, whereby suction is performed (S8). As a result, saline that has been fed to stop oozing bleeding and accumulated is suctioned from the opening portion 21c at the distal end portion of the sheath portion 32 of the treatment instrument 11. In Fig. 6, at a time t2, the energy output and the driving of the liquid feeding pump 47 are stopped and suction is started.

Note that driving of the suction pump 49 may be performed after a lapse of a predetermined period of time from stoppage of the energy output. For example, the pump 49 may be driven after a lapse of a period of time from stoppage of an energy output to the extent that a surgeon does not feel stressed about the period of time. The period of time to the extent that a surgeon does not feel stressed about the period of time is, for example, a time lag of 0.5 seconds.

Simultaneously with the start of the suction, the CPU 41 further starts time measurement using, e.g., a software counter that is separate from the counter for output time period measurement, to measure a suction time period Ts (S9).

The CPU 41 determines whether or not an instruction for a start of an energy output is provided by a relevant one of the switches 37 being operated during the suction (S10). If an energy output is started (S10: YES), the CPU 41 discontinues the output of the pump drive signal PsOUT to the pump drive section 48 to stop the pump 49, whereby the suction is stopped (S11), and the processing returns to S1. In other words, upon receipt of an instruction for generating energy to the HF output section 44, which is an energy generation section, after stoppage of an energy output, the CPU 41 stops the pump 49 to prioritize the instruction provided via a surgeon's operation.

If no energy output is started (S10: NO), whether or not a period of time passed from the start of the suction has reached the read suction time period Ts is determined (S12). The CPU 41 determines whether or not a period of time from the start of the suction has reached the read suction time period Ts. If the period of time from the start of the suction has not yet reached the suction time period Ts read from the storage section 42 (S12: NO), the processing returns to S8 and the suction is continued.

If the period of time passed from the start of the suction has reached the suction time period Ts (S12: YES), the CPU 41 stops the output of the pump drive signal PsOUT to the pump drive section 48 to stop the suction (S13), and clears the two counters used for measuring the output time period and the suction time period (S14). In Fig. 6, at a time t3, the suction is stopped.

In other words, the CPU 41, which is a control section, controls the pump 49 so that in connection with stoppage of an output of energy from the HF output section 44, which is an energy generation section, saline is suctioned by the pump 49 for a predetermined period of time after the stoppage of the energy output. More specifically, the CPU 41 performs control so that driving of the pump 49 is started in response to stoppage of an output of energy, so as to perform suction of saline by the pump 49 for a suction time period according to an energy output time period or a liquid feeding time period, and the pump 49 is stopped after suction of saline by the pump 49 for the predetermined period of time.

As a result, suction is performed during a set suction time period Ts, and thus, saline accumulated as a result of being fed at the time of energy-used treatment is suctioned in the amount of the accumulation. In other words, a surgeon performs suction of saline accumulated inside a body as a result of a treatment to stop oozing bleeding with no assistant, and thus, the accumulated saline is removed without the need for an assistant and without hindrance of the vision by a suction tube operated by an assistant, enabling the surgeon to promptly continue the surgical operation.

As described above, with the above-described surgical apparatus 1 according to the present embodiment, when, e.g., treatment for oozing bleeding is provided, saline accumulated inside the body is promptly removed, enabling a surgeon to promptly continue the surgical operation. As a result, the duration of the surgical operation can be reduced.

(Second Embodiment)

Although in the above-described first embodiment, in connection with stoppage of an energy output, the CPU 41 drives the pump 49 to start suction, in a second embodiment, suction is restricted by mechanically pressing the suction tube 26 or the suction tube 21d according to a pinching operation performed via the handle portion 36 and suction is started when the pinching operation is cancelled.

Fig. 7 is a diagram for describing a configuration of a surgical apparatus 1A according to the present embodiment. In Fig. 7, components that are the same as those in Fig. 1 are provided with reference numerals that are the same as those in Fig.

1, and a description thereof will be omitted. Here, a handle portion 36A is operated so as to be closed when an instruction for an energy output is provided.

In the surgical apparatus 1A, a movable handle 36b1 in a treatment instrument 11A includes a projection portion 51 that abuts against and thereby deforms a suction tube 21d when the handle portion 36A is closed. Also, inside a fixed handle 36a, a receiving member 52 that receives the suction tube 21d deformed by the projection portion 51 is provided in a fixed manner.

In other words, if the handle portion 36A is closed and the movable handle 36b1 is thereby moved in the direction indicated by solid arrow b in Fig. 7, the projection portion 51 mechanically presses the suction tube 21d against the receiving member 52 inside the fixed handle 36a to deform the suction tube 21d so that suction from the pump 49 via the suction tube 21d is stopped. If a surgeon opens the handle portion 36A, the suction tube 21d is released from the force from the projection portion 51 and thus, saline flows inside the suction tube 21d.

Accordingly, the projection portion 51 and the receiving member 52 in the handle portion 36A form a liquid suction restricting mechanism arranged at a position midway in the suction tube 21d, the liquid suction restricting mechanism restricting the flow of a suctioned liquid inside the suction tube 21d in response to an operation of the movable handle 36, which is an operating handle.

Configurations of a power supply unit 12, a liquid feeding unit 13 and a suction unit 14 are similar to those illustrated in Fig. 2. The content of processing performed by a CPU 41 is different from that in the first embodiment.

Figs. 8 and 9 are flowcharts illustrating an example of processing performed by the CPU 41 that controls an HF output section 44 and pump drive sections 46 and 48. In Figs. 8 and 9, processing steps that are the same as those in Figs. 4 and 5 are provided with reference numerals that are the same as those in Figs. 4 and 5, and only a simplified description thereof will be provided. Figs. 8 and 9 are different from Figs. 4 and 5 in terms of, e.g., the order of processing steps. Fig. 10 is a timing chart of an output signal EOUT for a high-frequency current output, a pump

drive signal PiOUT for a pump 47, a pump drive signal PsOUT for the pump 49, and suction of saline from an opening portion 21c.

In Fig. 8, upon receipt of an instruction for an energy output provided by depression of a relevant one of switches 37, the CPU 41 provides an energy output designated by the instruction (S1), and subsequently, outputs a drive signal to the pump drive section 46 to drive the pump 47 to feed a liquid (S2). Then, the CPU 41 outputs a pump drive signal PsOUT to the pump drive section 48 to drive the pump 49 to perform suction (S8).

When the instruction for an energy output is provided, the handle portion 36A is closed, and thus, the projection portion 51 deforms the liquid feeding tube 21d. Accordingly, even if the pump 49 is driven, suction by the pump 49 is not performed. In Fig. 10, an output of an output signal EOUT is started at a time t11, but suction of saline is not performed.

Subsequent to S8, the CPU 41 starts measurement of an output time period (S3), and subsequently, determines whether or not the energy output is stopped (S4).

If no instruction for stopping the energy output is provided (S4: NO), the processing returns to S1. If an instruction for stopping the energy output is provided as a result of the depression of the switch 37 being discontinued (S4: YES), the CPU 41 stops the measurement of the output time period (S5), stops the liquid feeding pump 47 (S6), and reads a suction time period Ts according the measured output time period, which is stored in a storage section 42 (S7).

When the surgeon opens the handle portion 36A along with the stoppage of the energy output, the projection portion 51 no longer presses the suction tube 21d, and thus suction is started. As a result, saline is suctioned from the opening portion 21c at a distal end portion of a sheath portion 32 in the treatment instrument 11. In Fig. 10, at a time t12, the energy output is stopped and suction is started.

After the stoppage of the energy output, the CPU 41 starts measurement of a suction time period (S9). The CPU 41 determines whether or not an instruction for a start of an energy output is provided by the switch 37 being operated when suction is performed (S10), and if an energy output is started (S10: YES), the handle portion

36A is closed, and the processing returns to S1. This is because an instruction according to a surgeon's operation is prioritized as in the first embodiment.

If no energy output is started (S10: NO), whether or not a period of time from the stoppage of the energy output has reached the read suction time period Ts is determined (S12), and if the period of time passed from the start of the suction has not reached the suction time period Ts yet (S12: NO), the processing returns to S9 and the suction is continued.

If the period of time from the start of the suction has reached the suction time period Ts (S12: YES), the CPU 41 discontinues the output of the pump drive signal PsOUT to the pump drive section 48 to stop the suction (S13) and thereby terminates the processing. In Fig. 10, at a time t13, the suction is stopped.

Accordingly, with the present embodiment, also, suction is performed for a set liquid feeding time period Ts, and thus, saline accumulated inside a body as a result of treatment for oozing bleeding is suctioned after an energy output.

As described above, with the above-described surgical apparatus 1A according to the present embodiment, when, e.g., treatment for oozing bleeding is provided, saline accumulated inside the body is suctioned, and thus, the accumulated saline is removed without the need for an assistant and without hindrance of the vision by a suction tube operated by an assistant, enabling a surgeon to promptly continue the surgical operation.

Note that although in the above-described example, an operation of the switch 37 for an energy output and an opening/closing operation of the handle portion 36A are independent from each other, a switch may be provided in the handle portion 36A so that when the switch is closed by an operation of the movable handle 36b1 in the handle portion 36A, the switch is turned on to generate an instruction signal for an energy output. For example, in Fig. 7, a projection portion 53, which is separate from the projection portion 51, is provided in the movable handle 36b1 indicated in parentheses, and a switch 54 that is pressed by the projection portion 53 when the handle portion 36A is closed is provided in the fixed handle 36a.

Such configuration enables an operation of a switch for an energy output and an opening/closing operation of the handle portion 36A can be linked to each other.

As described above, with the surgical apparatus according to each of the above-described embodiments, when, e.g., treatment for oozing bleeding is provided, saline accumulated inside the body is promptly removed, enabling a surgeon to promptly continue the surgical operation.

The surgical apparatus according to each of the above-described embodiments is effective especially for energy-used treatment for the parenchyma of a liver. In the case of the parenchyma of a liver, which is surrounded by a membrane, oozing bleeding easily occurs. In such cases, with the surgical apparatus according to each of the above-described embodiments, saline is promptly removed after an end of an energy output for treatment, enabling a surgeon to promptly continue the surgical operation.

Note that the surgical apparatus according to each of the embodiments is effectively applicable not only to the parenchyma of a liver, but also to, e.g., other organs such as blood vessels.

(Modification 1)

Although in each of the two embodiments described above, suction is performed for a predetermined period of time after an end of an energy output, it is possible that suction is performed in a predetermined amount instead of the suction being performed for a predetermined period of time. In other words, a CPU 41 may control a pump 49 so as to suction a predetermined amount of liquid according to an output time period or a liquid feeding time period at the time of an output for energy-used treatment.

In such case, also, information on the predetermined amount, that is, a suction amount, is stored in a storage section 42, and as in the two embodiments described above, the predetermined amount is set so as to vary according to a measured output time period or a measured liquid feeding period. Furthermore, values of the liquid feeding amounts stored in the storage section 42 can be set/changed by a surgeon.

(Modification 2)

Although in the two embodiments and modification 1 described above, a suction time period or a suction amount is a suction time period or a suction amount set in advance in the storage section 42 according to an energy output time period or a liquid feeding time period, a suction pattern such as a suction time period may be changed according to a value of an impedance of a living tissue pinched between a probe 31a and a movable member 31b, which is detected by an impedance detection section 45.

(Modification 3)

Although in the two embodiments and modification 1 described above, a suction time period or a suction amount is a suction time period or a suction amount set in advance in a storage section 42 according to an energy output time period or a liquid feeding time period, a surgeon may set a suction time period or a suction amount via an operating panel 40 to perform suction for the set suction time period or in the set suction amount irrespective of the energy output time period or the liquid feeding time period.

Accordingly, a CPU 41 controls a pump 49 so as to perform suction for the set suction time period or in the set suction amount after an end of an energy output.

(Modification 4)

Although in the two embodiments and the respective modifications described above, a liquid feeding tube 21b and a suction tube 21d are each provided inside a treatment instrument 11 or 11A, provision of the tubes inside a sheath portion 32 causes the problem of an increase in diameter of the sheath portion 32. Therefore, at least one of the liquid feeding tube 21b and the suction tube 21d may be substituted by a space between an inner pipe and an outer pipe inside the sheath portion 32 or a space between the inner pipe and a probe 31a.

In such case, the inside and the outside of each of the inner pipe and the outer pipe are coated with an insulating material. This is intended to prevent occurrence of electrical conduction even if saline exists between the inner pipe and the outer pipe or between the inner pipe and the probe 31a.

For example, where saline is made to flow on the outside of the probe 31a, an electrical short between the circuit probe 31a and the inner pipe can be prevented. Furthermore, where saline is made to flow between the inner pipe and the outer pipe, an electrical short between the inner pipe and the outer pipe can be prevented.

Coating of the insides of the inner pipe and the outer pipe with an insulating material can be performed by inserting an injection nozzle to the inside of each of the pipes and injecting the insulating material from the nozzle while the nozzle is moved inside the pipe.

Such configuration enables supply of saline to a treatment section 31 without an increase in diameter of the sheath portion 32. Furthermore, provision of insulating coating as described above reduces resistance to slide relative to the outer pipe if the inner pipe is a drive shaft for the scissors shape type.

The present invention is not limited to the above-described embodiments, and various modifications, alterations and the like are possible without departing from the spirit of the present invention.

WHAT IS CLAIMED IS:

1. A surgical apparatus comprising:

a treatment section for treating a living tissue;

an energy generation section for providing high-frequency current to the treatment section;

a liquid feeding conduit for feeding a liquid to the living tissue;

a suction conduit for suctioning the liquid;

an energy control section that outputs a high-frequency output control signal for controlling the high-frequency current from the energy generation section;

a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal from the energy control section, and stops feeding of the liquid from the liquid feeding conduit, in response to a command for stopping the high-frequency output control signal; and

a second pump drive section that suctions the liquid from the suction conduit for a predetermined period of time or in a predetermined amount, in response to a command for stopping the high-frequency output control signal from the energy control section, and stops suction of the liquid from the suction conduit after the suction for the predetermined period of time or in the predetermined amount.

2. The surgical apparatus according to claim 1, wherein the predetermined period of time or the predetermined amount is stored in a storage section and can be set/changed.

3. The surgical apparatus according to claim 1, wherein the predetermined period of time or the predetermined amount is set according to a period of time of outputting the energy or a period of time of driving the first pump.

4. The surgical apparatus according to claim 1, wherein upon receipt of an instruction for generating the energy to the energy generation section after stoppage of the output of the energy, the energy control section stops the second pump.

5. The surgical apparatus according to claim 1, wherein the energy control section performs control so that driving of the second pump is started so as to perform suction of the liquid via the second pump, in response to the stoppage of the output of the high-frequency output control signal, and the pump is stopped after supply of the liquid via the second pump for the predetermined period of time or in the predetermined amount.

6. The surgical apparatus according to claim 1, further comprising a liquid suction restricting mechanism arranged at a position midway in the suction conduit, the suction restricting mechanism restricting suction of the liquid flowing in the suction conduit in response to an operation of an operating handle.

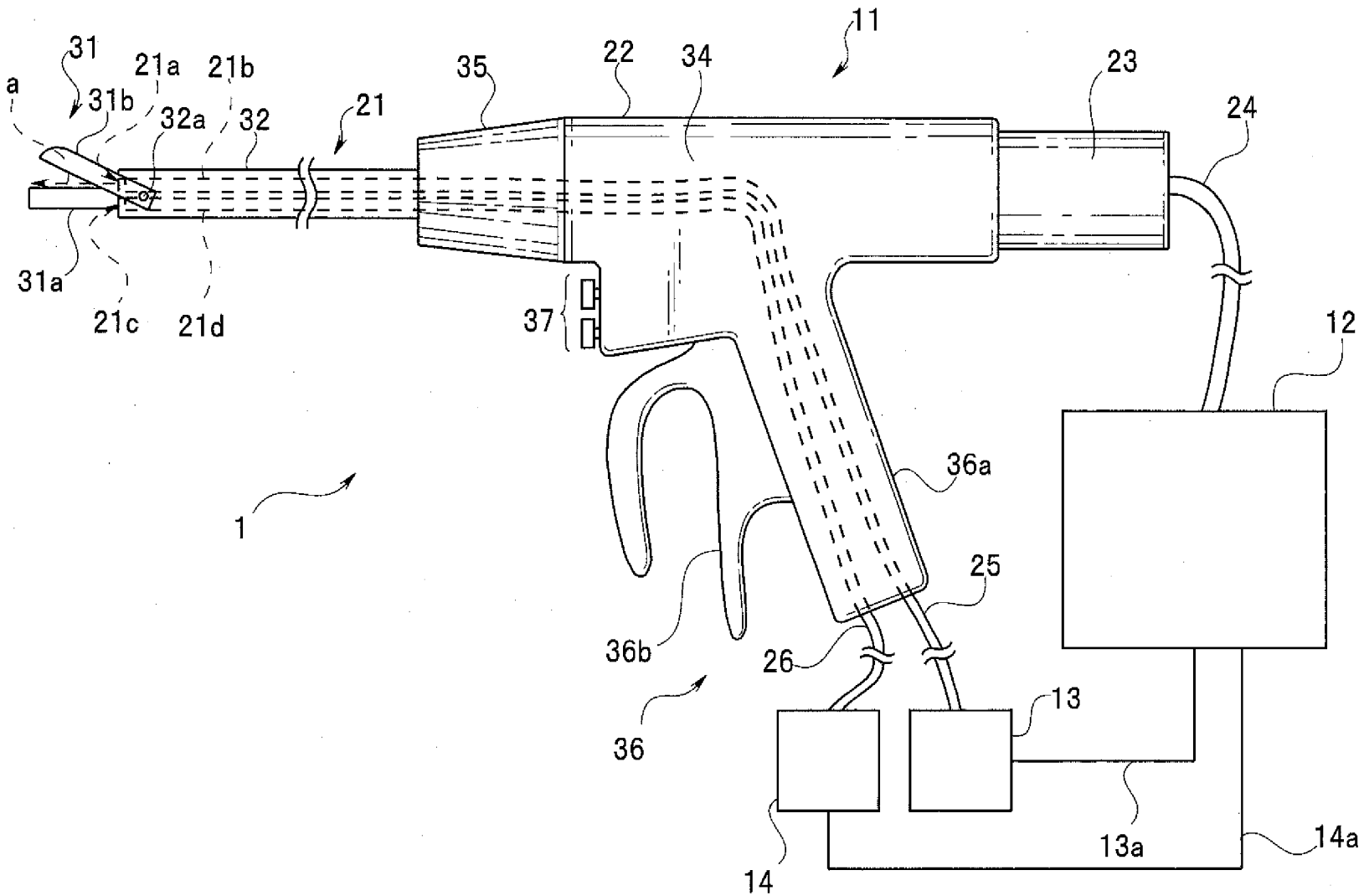
7. The surgical apparatus according to claim 1, comprising an impedance detection section that detects an impedance between two pinching members that pinch the living tissue in the treatment section,

wherein the predetermined period of time or the predetermined amount varies according to the impedance detected by the impedance detection section.

ABSTRACT OF THE DISCLOSURE

A surgical apparatus includes: a treatment section for treating a living tissue; an energy generation section for providing high-frequency current to the treatment section; a liquid feeding conduit for feeding a liquid to the living tissue; a suction conduit for suctioning the liquid; an energy control section that outputs a high-frequency output control signal for controlling the high-frequency current from the energy generation section; a first pump drive section that feeds the liquid from the liquid feeding conduit while the high-frequency current is output, in response to a command for an output of the high-frequency output control signal, and stops feeding of the liquid from the liquid feeding conduit, in response to a command for stopping the high-frequency output control signal; and a second pump drive section that suctions the liquid from the suction conduit for a predetermined period of time or in a predetermined amount, in response to a command for stopping the high-frequency output control signal, and stops suction of the liquid from the suction conduit after the suction for the predetermined period of time or in the predetermined amount.

FIG.1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36b
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36
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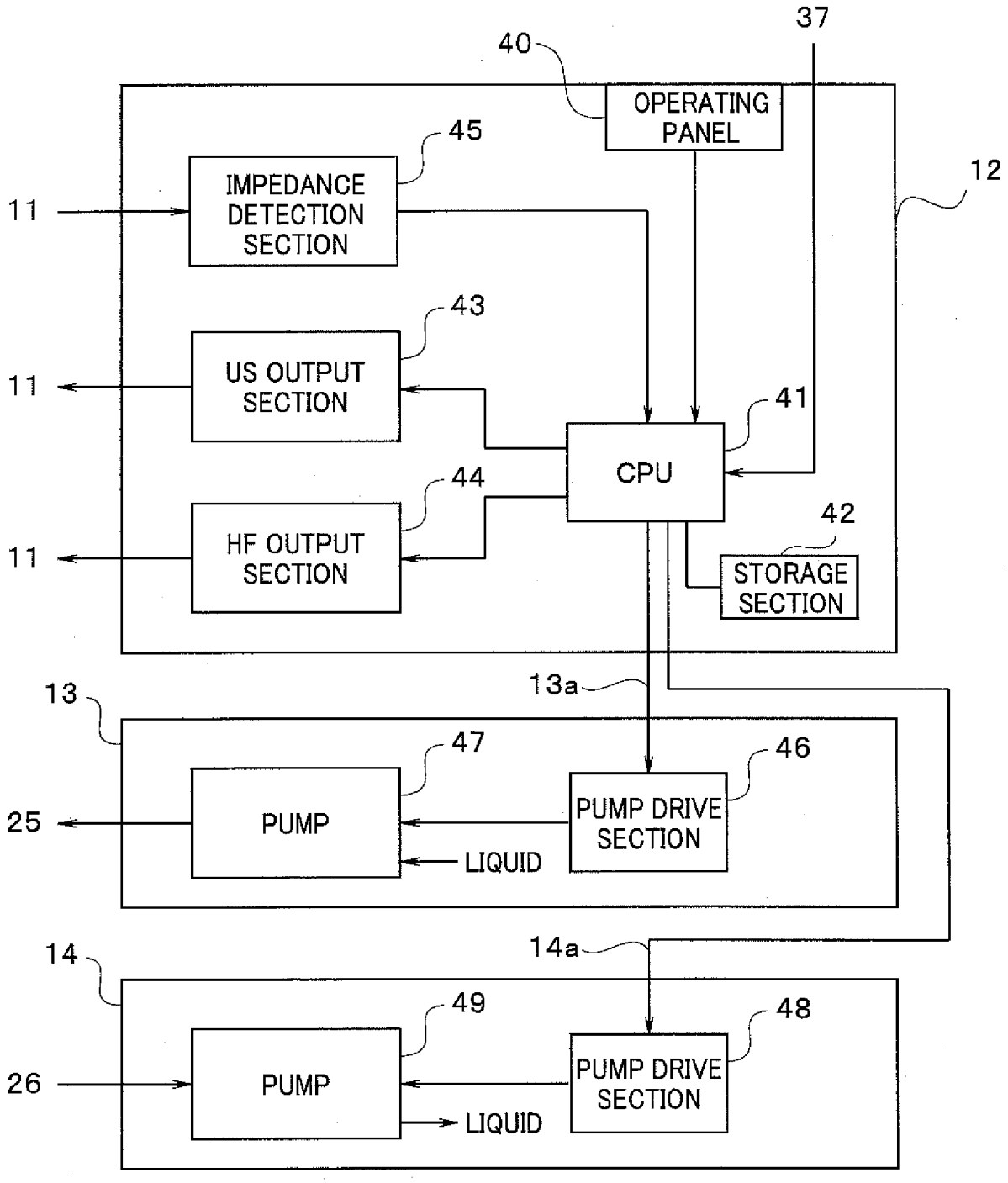
13a
14a

FIG.2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OPERATING PANEL
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IMPEDANCE DETECTION SECTION
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43
US OUTPUT SECTION
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41
CPU
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42
STORAGE SECTION
13
13a
47
46
PUMP
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LIQUID
14a
14
49
48
PUMP
PUMP DRIVE SECTION
26
LIQUID

FIG.3

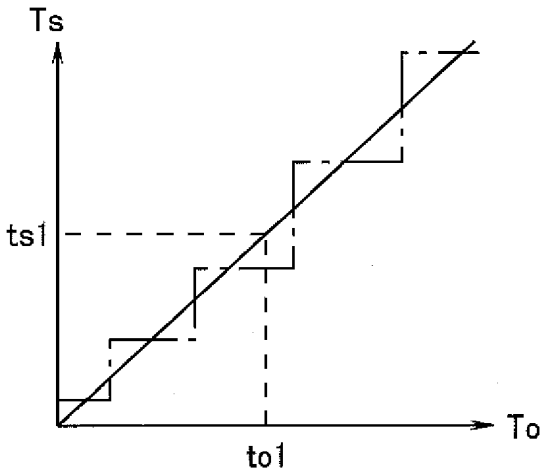
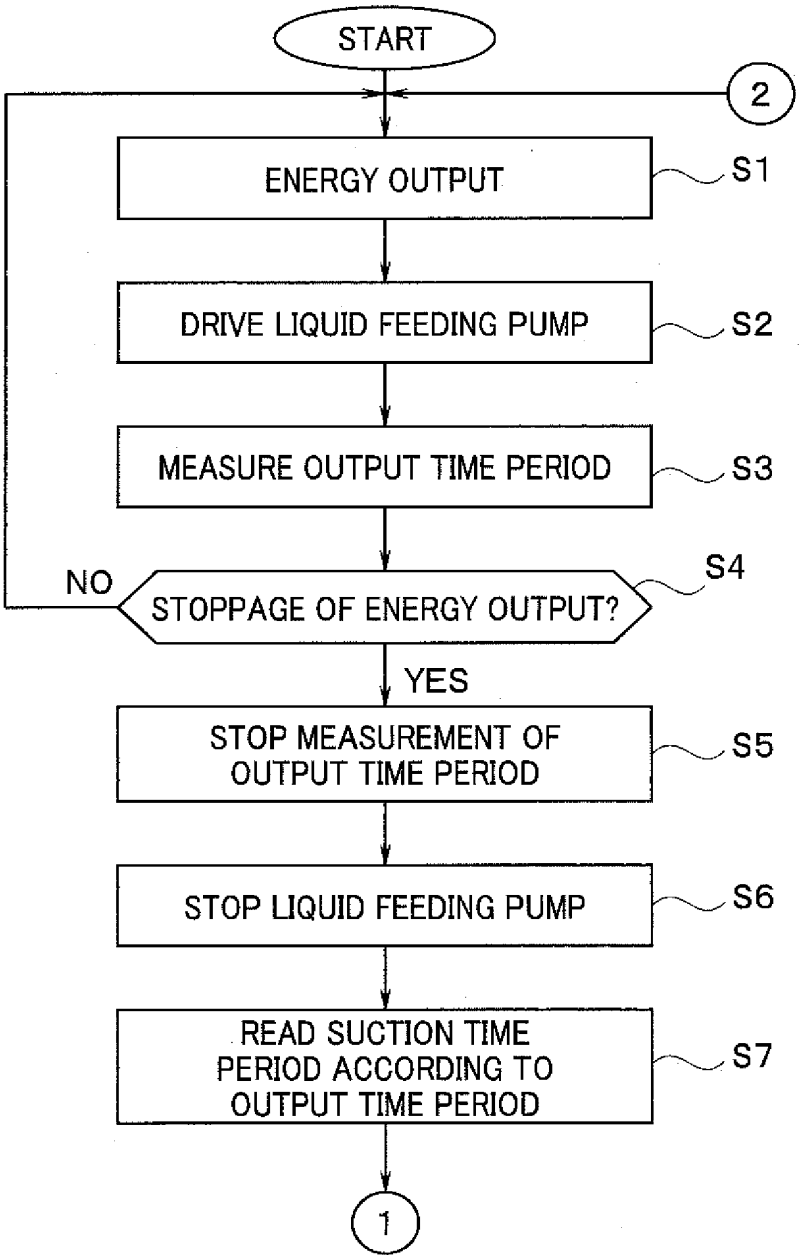


FIG.4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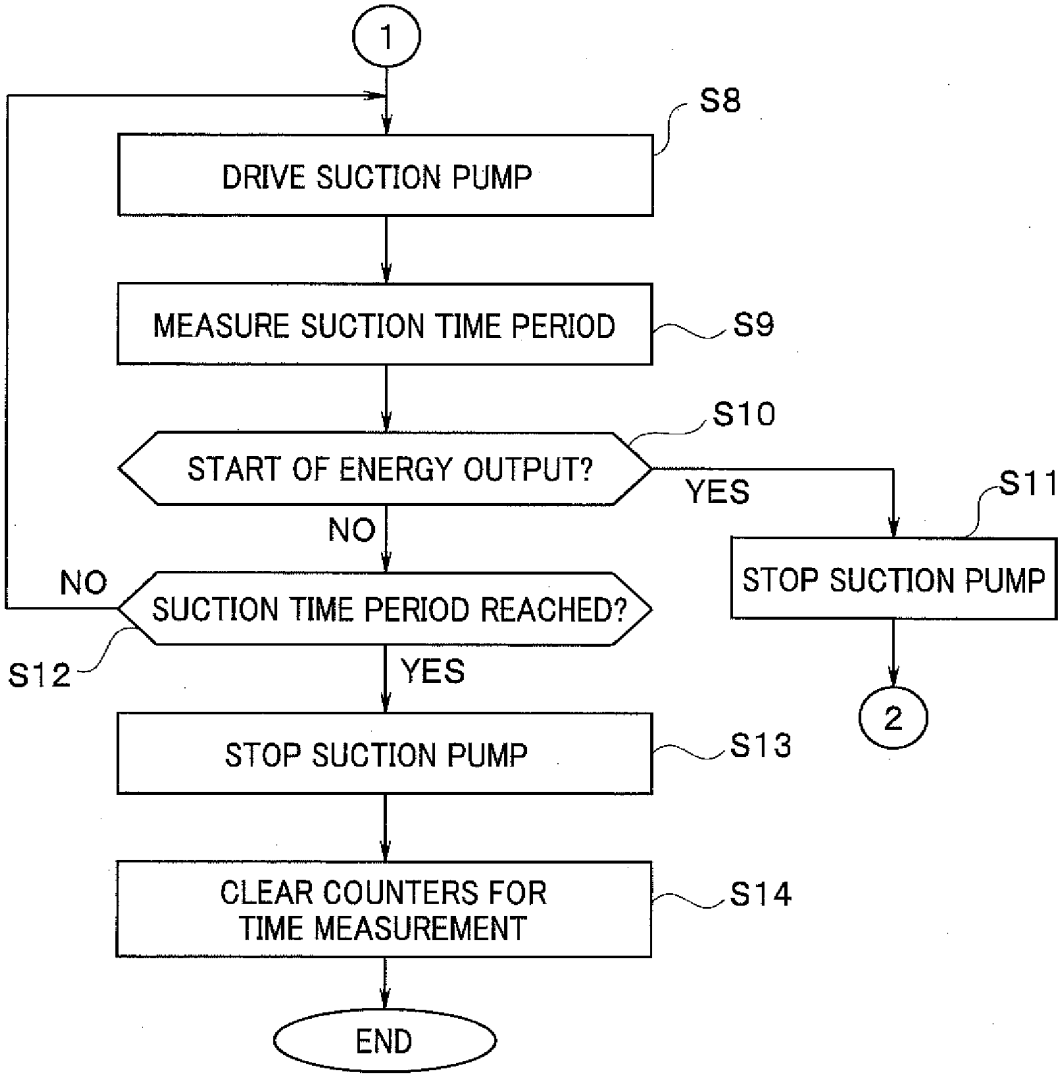
2
ENERGY OUTPUT
S1
DRIVE LIQUID FEEDING PUMP
S2
MEASURE OUTPUT TIME PERIOD
S3
NO
STOPPAGE OF ENERGY OUTPUT?
S4
YES
STOP MEASUREMENT OF OUTPUT TIME PERIOD
S5
STOP LIQUID FEEDING PUMP
S6
READ SUCTION TIME PERIOD ACCORDING TO OUTPUT TIME PERIOD
S7
1

FIG.5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S8
DRIVE SUCTION PUMP
MEASURE SUCTION TIME PERIOD
S9
S10
START OF ENERGY OUTPUT?
YES
S11
STOP SUCTION PUMP
2
NO
SUCTION TIME PERIOD REACHED?
NO
S12
YES
STOP SUCTION PUMP
S13
CLEAR COUNTERS FOR TIME MEASUREMENT
S14
END

FIG.6

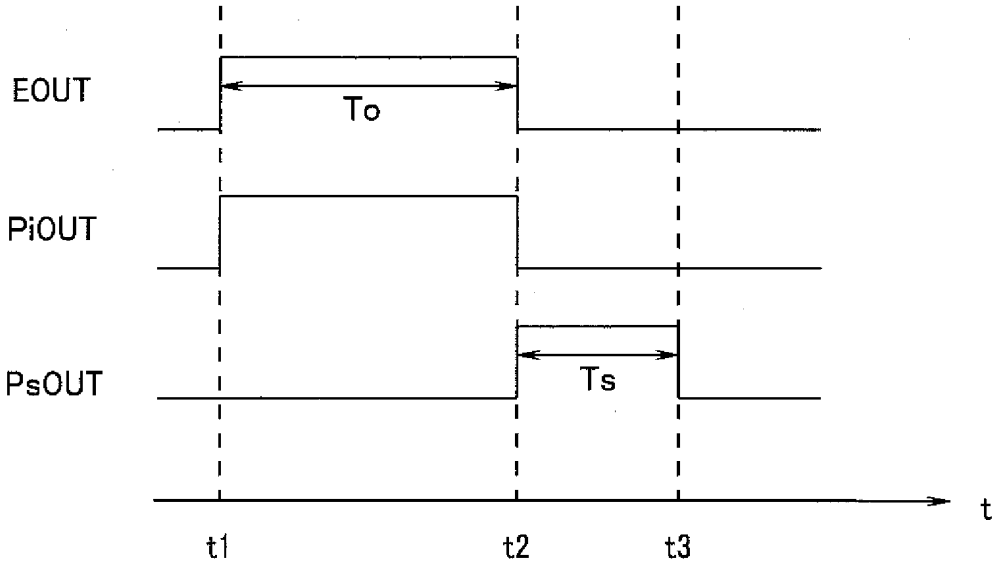
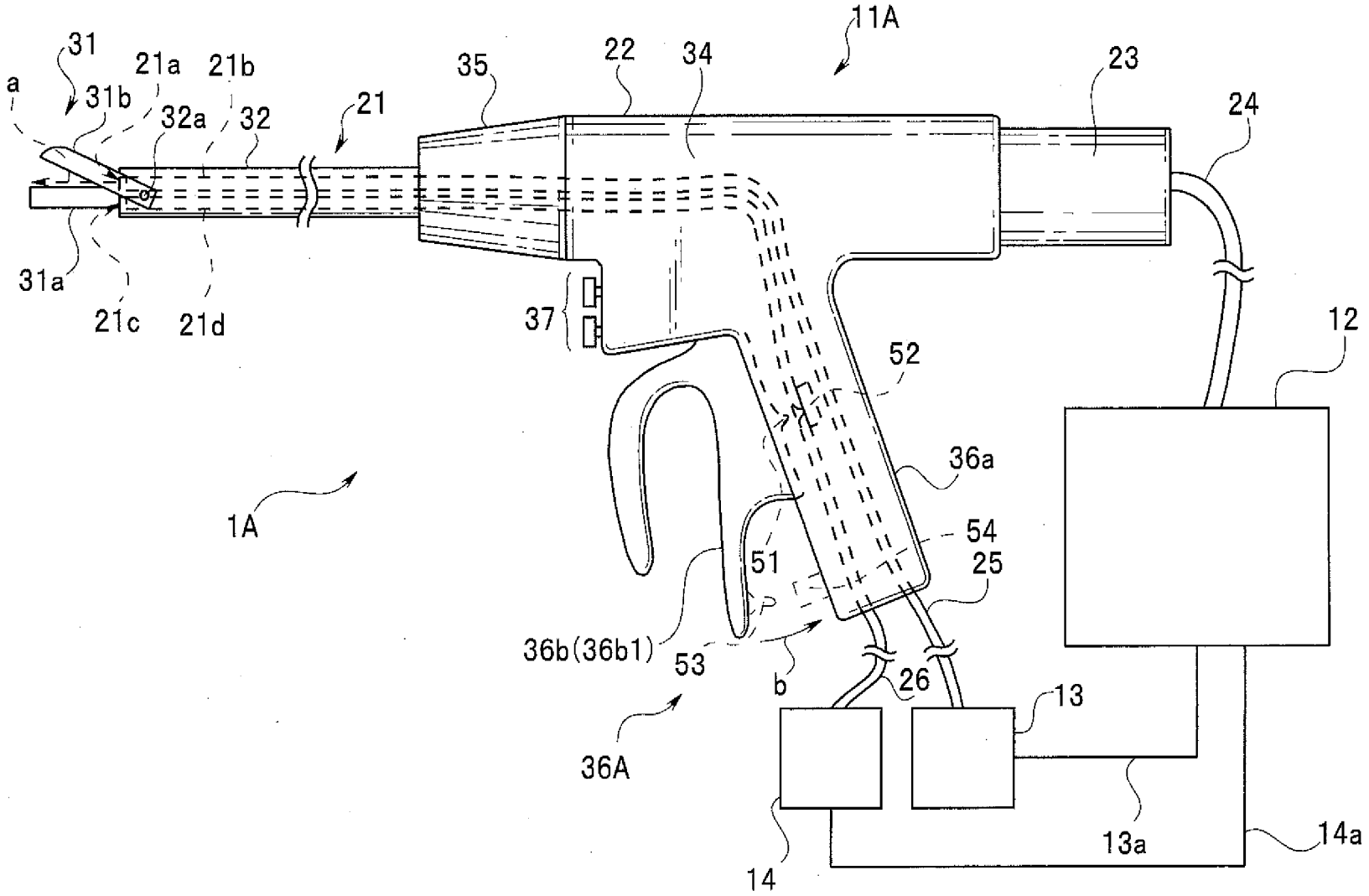


FIG.7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24
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37
12
52
36a
1A
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51
25
36b(36b1)
53
b
26
13
36A
14
13a
14a

FIG.8

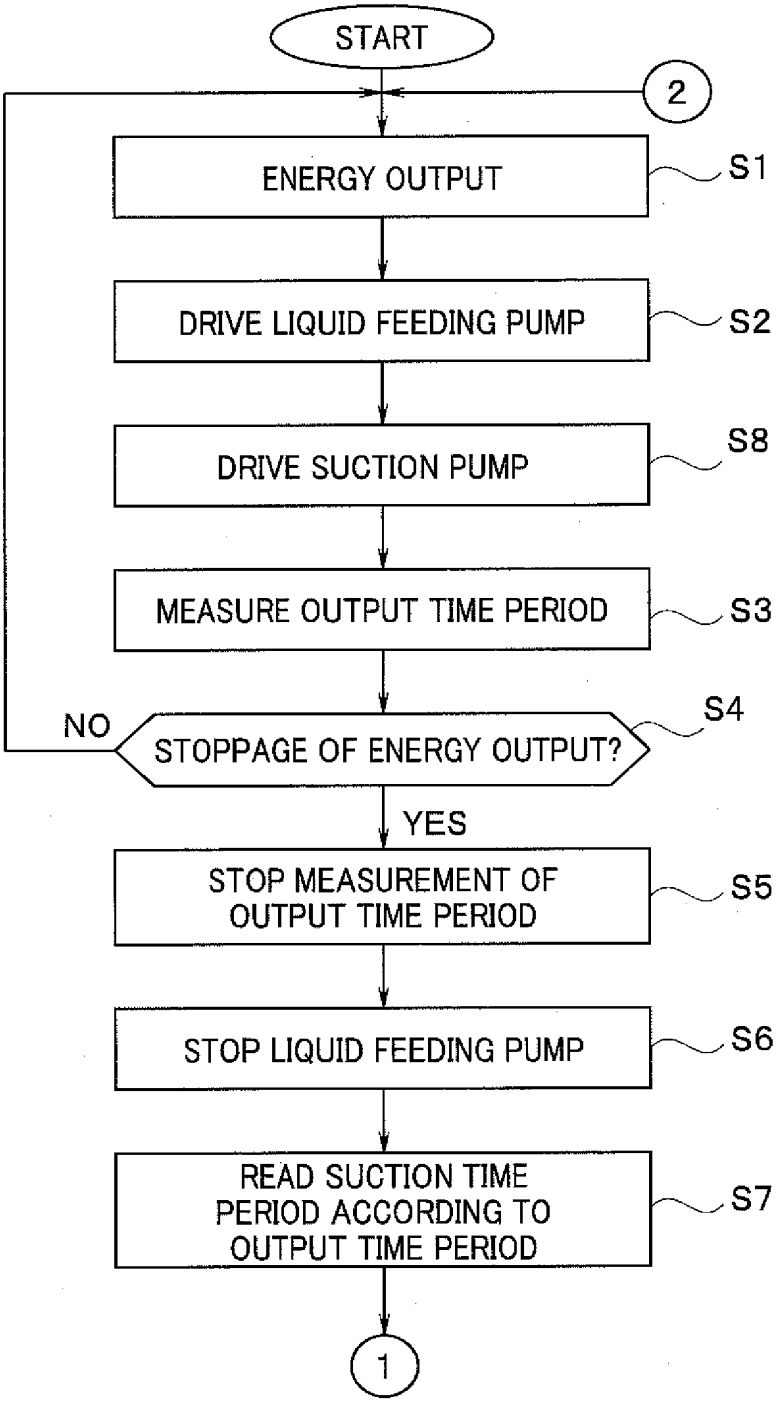
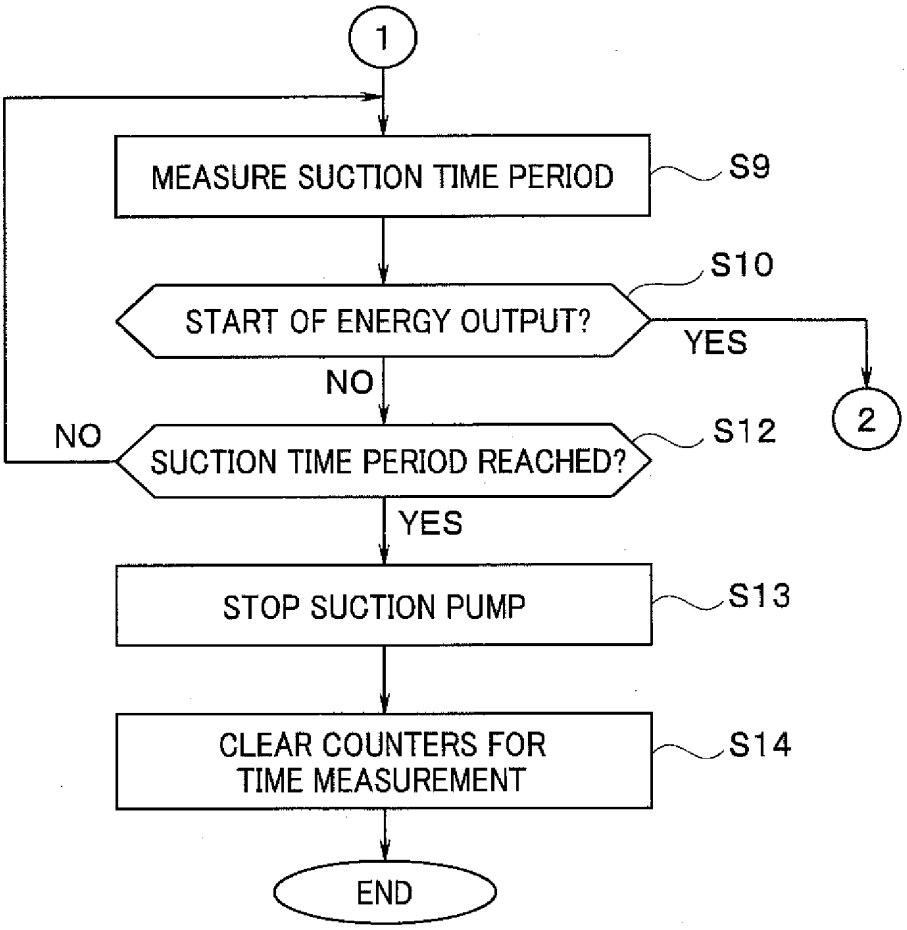

START
2
ENERGY OUTPUT
S1
DRIVE LIQUID FEEDING PUMP
S2
DRIVE SUCTION PUMP
S8
MEASURE OUTPUT TIME PERIOD
S3
NO
STOPPAGE OF ENERGY OUTPUT?
S4
YES
STOP MEASUREMENT OF OUTPUT TIME PERIOD
S5
STOP LIQUID FEEDING PUMP
S6
READ SUCTION TIME PERIOD ACCORDING TO OUTPUT TIME PERIOD
S7
1

FIG.9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S9
S10
START OF ENERGY OUTPUT?
YES
2
NO
NO
SUCTION TIME PERIOD REACHED?
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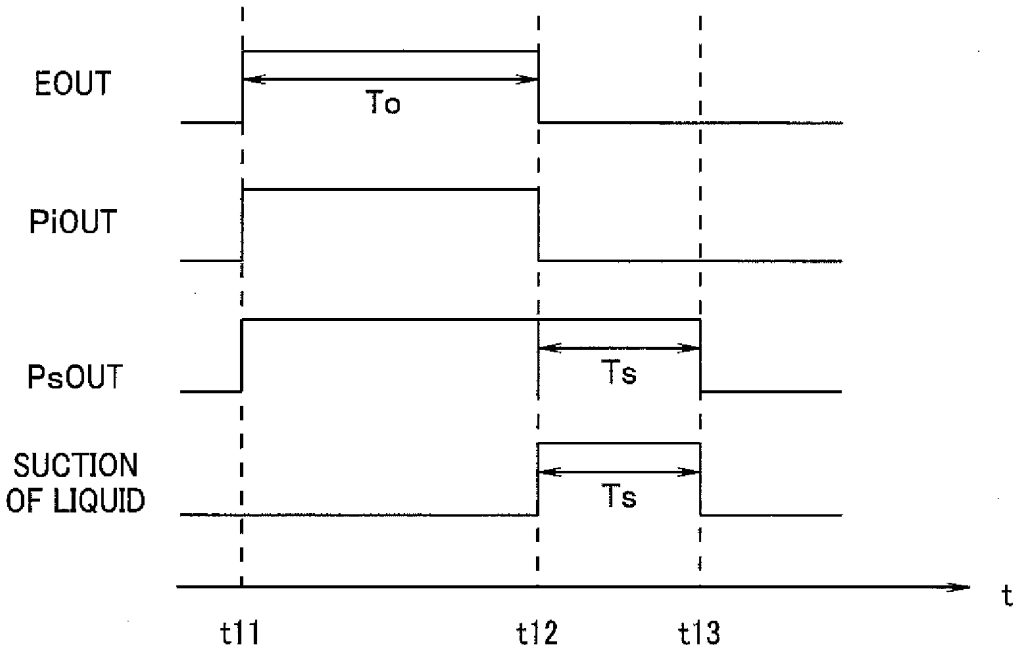
STOP SUCTION PUMP
S13
CLEAR COUNTERS FOR TIME MEASUREMENT
S14
END

FIG.10



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: 14/163,528

Filed: January 24, 2014

For: SURGICAL DEVICE

Attn: OIPE

Docket No.: 153190

CONFIRMATION OF FILING OF TRANSLATION OF PROVISIONAL APPLICATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In accordance with 37 CFR 1.78 (a)(5), an accurate translation of Provisional Application No. 61/636,269, filed on April 20, 2012, has been filed in the provisional application.

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JAO:TMG/OZH/jxr

Date: March 24, 2014

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Electronic Patent Application Fee Transmittal

Application Number:	14163528
Filing Date:	24-Jan-2014
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Filer:	James Albert Oliff/Jovita Rudd
Attorney Docket Number:	153190

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Non-English Translation	1053	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**140**

Electronic Acknowledgement Receipt

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Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Jovita Rudd
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	24-MAR-2014
Filing Date:	24-JAN-2014
Time Stamp:	15:10:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$140
RAM confirmation Number	1707
Deposit Account	150461
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	153190_Response.pdf	216749 d6fe2407fd071c422ee6e352a3f6fd7e47aad101	no	4
Warnings:					
Information:					
2		153190_Prelim.pdf	97949 4e38892da5f37f094718c2e48c4b2b8880c4bc0f	yes	4

Multipart Description/PDF files in .zip description

Document Description	Start	End
Preliminary Amendment	1	1
Specification	2	2
Applicant Arguments/Remarks Made in an Amendment	3	3
Abstract	4	4

Warnings:					
Information:					
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Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	18
Claims	19	20
Abstract	21	21
Drawings-only black and white line drawings	22	31

Warnings:					
Information:					
4	Miscellaneous Incoming Letter	153190_Conf_of_Filing.pdf	38253 fccf2bab87be8ee79f244008f4fc88c6aa5ce92b	no	1
Warnings:					
Information:					

5	Fee Worksheet (SB06)	fee-info.pdf	29996 563b68f0708a9d8a48304ba9ea6a546344f3f2ee	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1755427

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/163,528

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	1 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/163,528	01/24/2014		1600	153190	1	1

CONFIRMATION NO. 1030

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

FILING RECEIPT

OC000000066528896

Date Mailed: 02/10/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)
Hideo SANAI, Hachioji-shi, JAPAN;

Applicant(s)
OLYMPUS MEDICAL SYSTEMS CORP., Tokyo, JAPAN

Assignment For Published Patent Application
OLYMPUS MEDICAL SYSTEMS CORP., Tokyo, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 25944

Domestic Priority data as claimed by applicant
This application is a CON of PCT/JP2013/060447 04/05/2013
which claims benefit of 61/636,269 04/20/2012

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 02/07/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/163,528**
Projected Publication Date: To Be Determined - pending completion of Missing Parts
Non-Publication Request: No

Early Publication Request: No
Title

SURGICAL DEVICE

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/163,528	01/24/2014	Hideo SANAI	153190

CONFIRMATION NO. 1030

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

FORMALITIES LETTER

OC000000066528897

Date Mailed: 02/10/2014

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The application was filed in a language other than English. Applicant is required to provide an English translation of the specification, a statement that the translation is accurate, and the processing fee set forth in 37 CFR 1.17(i). (See 37 CFR 1.52(d)).
- The above-identified nonprovisional application is claiming the benefit of a prior-filed provisional application that is in a non-English language. Pursuant to 37 CFR 1.78(a)(5), applicant is required to file:

  1. In the prior-filed provisional application, an English language translation of the prior-filed provisional application and a statement that the translation is accurate; and

  2. In the above-identified nonprovisional application, a confirmation that the translation and statement have been filed in the prior-filed provisional application.

  To avoid abandonment of the above-identified nonprovisional application, applicant is required to file these items within the time period set forth in this notice, unless applicant files a corrected application data sheet in compliance with 37 CFR 1.76 and, if appropriate, an amendment to the specification, to delete the benefit claim within the time period. Please note that once applicant deletes the benefit claim to the prior-filed provisional application, the Office will not accept any resubmission of the benefit claim.

  Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.
- Applicant must file an English translation of the application, the $ 140 fee set forth in 37 CFR 1.17(i), unless previously submitted, and a statement that the translation is accurate (37 CFR 1.52(d)).

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are:

- $ **140** English translation surcharge.
- $(**.00**) Previous Payment Amount.
- $ **140** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
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Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/ebanaybanay/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/163,528	01/24/2014	Hideo SANAI	153190

CONFIRMATION NO. 1030

POA ACCEPTANCE LETTER

25944
OLIFF PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

OC000000066518674

Date Mailed: 02/10/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/24/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/abalinang/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Oliff PLC
Telephone: (703) 836-6400
Facsimile: (703) 836-2787

Attorney Docket No.: 153190

Customer Number: **25944**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CONTINUING APPLICATION TRANSMITTAL
RULE 1.53(B)

Transmitted herewith for filing under 37 C.F.R. §1.53(b) is a

☒ Continuation ☐ Divisional ☐ Continuation-in-Part

application of prior pending International Application No. PCT/JP2013/060447 filed April 5, 2013, which claims the benefit of U.S. Provisional Application No. 61/636,269 filed April 20, 2012,

For (Title): Surgical Device

By (Inventors): Hideo SANAI

1. ☒ A Declaration of the inventor(s) is attached. The attached Declaration is:

   ☐ a. A copy of the Declaration from the parent application. (Used with the same or fewer inventors and (a) a copy of the prior application or (b) a revised, reformatted or edited version of the prior application that does not contain new matter.)

   ☒ b. A new Declaration. (Used with the same, fewer or additional inventors and (a) a copy of the prior application, (b) a revised, reformatted or edited version of the prior application that does not contain new matter, or (c) a new specification.)

   ☒ The Declaration is a combined English-language/foreign-language Declaration. On information and belief, the English-language portions of the Declaration are accurate translations of the foreign-language portions.

2. ☒ A Power of Attorney from the applicant is attached. The attached Power of Attorney is:

   ☐ a. A copy of the Power of Attorney from the parent application.

   ☒ b. A new Power of Attorney.

   ☒ The Power of Attorney is a General Power of Attorney.

   ☐ The Power of Attorney is a Specific Power of Attorney for this application.

   ☐ The Power of Attorney is in a combined Declaration/Power of Attorney.

   ☐ a. The Power of Attorney identifies no more than ten attorneys.

   ☐ b. The Power of Attorney identifies more than ten attorneys, and a separate Designation of Attorneys for Power of Attorney is filed herewith.

   ☐ c. The Power of Attorney is to the attorneys associated with a Customer Number.

3. ☒ The fees due upon filing are calculated below:

CLAIMS IN THE APPLICATION AFTER ENTRY OF ANY PRELIMINARY AMENDMENT NOTED BELOW

FOR:	NO. FILED	NO. EXTRA	SMALL ENTITY RATE	SMALL ENTITY FEE		OTHER THAN A SMALL ENTITY RATE	OTHER THAN A SMALL ENTITY FEE
BASIC FEE				$ 140	OR		$ 280
EXAMINATION FEE				$ 360	OR		$ 720
SEARCH FEE				$ 300	OR		$ 600
APPLICATION SIZE FEE Total pages 27 - 100 =	0 ÷ 50	= †0	x 200 =	$		x 400 =	$ 0
TOTAL CLAIMS	20 - 20	= *0	x 40 =	$	OR	x 80 =	$ 0
INDEP CLAIMS	3 - 3	= *0	x 210 =	$	OR	x 420 =	$ 0
☐ MULTIPLE DEPENDENT CLAIMS PRESENTED			+ 390 =	$	OR	+ 780 =	$ 0
☐ NON-ELECTRONIC FILING FEE				$ 200			$ 0
			TOTAL	$	OR	TOTAL	$ 1,600

*If the difference is less than zero, enter "0".
†round up to next integer

4. ☒ Please charge Deposit Account No. 15-0461 in the amount of $1,600.00 to cover the above fees. The Commissioner is hereby authorized to charge any other fees that may be required to complete this filing, or to credit any overpayment, to Deposit Account No. 15-0461.

5. ☒ Application Data Sheet is attached.

6. ☒ Formal drawings (Figs. 1-10) are attached.

☐ Use Figure for front page of Publication.

7. ☐ Priority of foreign application(s) No. _____ filed _____ in _____ is claimed under 35 U.S.C. §119 and/or §365(b).

☐ The certified copy was filed in prior Application No. _____ on _____.

☐ An electronic copy of the above foreign application(s) was received by the PTO in prior Application No. _____.

☐ A certified copy of the above foreign application(s) is filed herewith.

☐ A copy of the priority document was transmitted by the International Bureau in prior Application No. _____.

☐ An electronic copy of the above foreign application should be automatically retrieved by the PTO in accordance with the electronic priority document exchange service.

8. ☒ Priority of U.S. Provisional Application No. 61/636,269 filed April 20, 2012 is claimed under 35 U.S.C. §119.

(A Preliminary Amendment is attached to reflect the claim of benefit in the specification if not already present.)

9. ☐ The prior application is assigned of record to _____, _____, _____ and recorded at Reel _____, Frame _____.

10. ☐ This application is filed by fewer than all the inventors named in the prior application (37 C.F.R §1.53(b)(1)). Delete the following inventor(s) named in the prior application:

_____ _____

_____ _____

11. ☐ A Preliminary Amendment is attached. The Preliminary Amendment amends the specification to reflect the continuation data. Claims added by this Amendment are properly numbered consecutively beginning with the number next following the highest numbered claim in the application and claims canceled are identified in the listing of claims.

12. ☒ An Information Disclosure Statement is attached.

13. ☐ Small entity status:

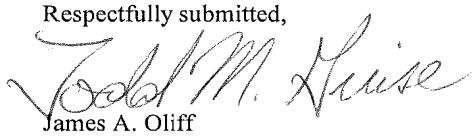
- ☐ a. Entitlement to small entity status is asserted.
- ☐ b. Small entity status is no longer claimed.

14. ☐ Other:

15. ☐ As also indicated in the attached Request, this application is NOT to be published under 35 U.S.C. 122(b). The undersigned attorney or agent hereby certifies that the invention disclosed in this application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication of applications 18 months after filing.

16. ☒ The claims in this continuing application differ from the claims in the parent application(s). As to each claim or claim term in this continuing application that is broader than any claim or claim term in any parent application, any previous disclaimer of claim scope made during prosecution of any parent application is rescinded. The Examiner is requested to consider such broader claims and/or claim terms in view of all of the prior art without any previous disclaimers.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Todd M. Guise
Registration No. 46,748

Olga Hernandez
Registration No. 58,232

JAO:TMG/OZH/cck

Date: January 24, 2014

DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry of this filing; Charge any fee due to our Deposit Account No. 15-0461

手術装置

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation application of PCT/JP2013/060447 filed on April 5, 2013 and claims benefit of U.S. Provisional Patent Application No. 61/636,269 filed in the U.S.A. on April 20, 2012, the entire contents of which are incorporated herein by this reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

本発明は、手術装置に関し、特に、高周波電流出力の可能な手術装置に関する。

2. Description of the Related Art

外科用処置具は、手術において、生体組織の凝固、切開等の処置を行うために用いられている。外科用処置具には、生体組織を挟持したり、あるいは接触させたりして処置するタイプのもの（いわゆるシザース形状あるいはヘラ形状タイプ）がある。また、外科用処置具には、例えば、高周波電流出力が可能な高周波処置具が知られている。外科用処置具には、例えば、超音波振動出力が可能な超音波処置具と、高周波電流出力が可能な高周波処置具、さらに近年は、超音波振動出力と高周波電流出力の同時出力が可能なエネルギー処置具も知られている。

シザース形状タイプの超音波処置具では、一方の部材が超音波振動し、他方のジョー部材は、挟持のために一方の部材に対して開閉される。また、シザース形状タイプの高周波処置具では、２つの部材を用いて高周波電流のバイポーラ出力がなされる。

このような処置具を用いて、生理食塩水を滴下しながら、高周波出力による処置を行う場合がある。例えば、肝臓実質に対する、ウージング出血に対する止血のために、すなわち広範囲に亘って滲み出すような出血を止めるために、生理食塩水を滴下しながら、高周波出力が行われる。ウージング出血している範囲を生理食塩水で浸した状態で高周波出力を与えることによって、ウージング出血に対する止血処置を広範囲に亘って行うことができる。このようなウージング出血に対する止血のための処置を行うと、体内に生理食塩水の水溜りができてしまうため、助手が吸引管を用いて溜まった生理食塩水を吸引する。

また、米国特許公開公報 US2010/137751A1 号明細書、米国特許公開公報 US2003/0040672A1 号明細書及び米国特許公開公報 US2010/0324458A1 号明細書には、処置中に処置具への液体の供給と、液体の吸引を行う手術装置が開示されている。

SUMMARY OF THE INVENTION

本発明の一態様の手術装置は、生体組織を処置するための処置部と、前記処置部に高周波電流を与えるためのエネルギー発生部と、前記生体組織に液体を

送出するための送液管路と、前記液体を吸引するための吸引管路と、前記エネルギー発生部の高周波電流を制御するための高周波出力制御信号を出力するエネルギー制御部と、前記エネルギー制御部の前記高周波出力制御信号の出力命令に応じて、前記高周波電流が出力されている間、前記送液管路から前記液体を送出するとともに、前記高周波出力制御信号の停止命令に応じて、前記送液管路からの前記液体の送出を停止する第１のポンプ駆動部と、前記エネルギー制御部の前記高周波出力制御信号の停止命令に応じて、所定の時間若しくは所定の量だけ、前記吸引管路から前記液体の吸引を行うとともに、前記所定の時間もしくは所定の量の吸引の後に前記吸引管路から前記液体の吸引を停止する第２のポンプ駆動部と、を有する。

BRIEF DESCRIPTION OF THE DRAWINGS

【図１】本発明の第１の実施の形態に係る手術装置の構成を説明するための図である。

【図２】本発明の第１の実施の形態に係る、電源ユニット１２、送液ユニット１３及び吸引ユニット１４の構成を示すブロック図である。

【図３】本発明の第１の実施の形態に係る、記憶部４２に記憶された、高周波出力時間Ｔｏと、吸引時間Ｔｓの関係を示す図である。

【図４】本発明の第１の実施の形態に係る、ＨＦ出力部４４、及びポンプ駆動部４６、４８を制御するＣＰＵ４１の処理の例を示すフローチャートである。

【図５】本発明の第１の実施の形態に係る、ＨＦ出力部４４、及びポンプ駆動部４６、４８を制御するＣＰＵ４１の処理の例を示すフローチャートである。

【図６】本発明の第１の実施の形態に係る、高周波電流出力のための出力信号ＥＯＵＴと、ポンプ４７、４９のポンプ駆動信号ＰｉＯＵＴ、ＰｓＯＵＴのタイミングチャートである。

【図７】本発明の第２の実施の形態に係る手術装置１Ａの構成を説明するための図である。

【図８】本発明の第２の実施の形態に係る、ＨＦ出力部４４及びポンプ駆動部４６、４８を制御するＣＰＵ４１の処理の例を示すフローチャートである。

【図９】本発明の第２の実施の形態に係る、ＨＦ出力部４４及びポンプ駆動部４６、４８を制御するＣＰＵ４１の処理の例を示すフローチャートである。

【図１０】本発明の第２の実施の形態に係る、高周波電流出力のための出力信号ＥＯＵＴと、ポンプ４７のポンプ駆動信号ＰｉＯＵＴと、ポンプ４９のポンプ駆動信号ＰｓＯＵＴと、開口部２１ｃからの生理食塩水の吸引のタイミングチャートである。

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

以下、本発明を、実施の形態により説明する。

（第１の実施の形態）

図１は、本発明の第１の実施の形態に係る手術装置の構成を説明するための図である。図１に示すように、手術装置１は、処置具１１、電源ユニット１２、送液ユニット１３及び吸引ユニット１４を含んで構成されている。

処置具１１は、超音波振動エネルギー及び高周波電流エネルギーの少なくとも一方を出力可能な、シザース形状タイプの外科用処置具である。処置具１１は、処置ユニット２１，ハンドルユニット２２、振動子ユニット２３、信号ケーブル２４及び送液チューブ２５を有して構成されている。

処置ユニット２１は、生体組織を処置するための処置部３１と、細長いシース部３２とから構成される。処置部３１は、プローブ３１ａと、ジョー部材である可動部材３１ｂとを有する。シース部３２は、筒状部材であり、内部にプローブ３１ａ、可動部材３１ｂの開閉を行うための軸部材等が挿通されている。可動部材３１ｂは、ハンドルユニット２２に対する操作による軸部材等の動きに応じて、シース部３２の先端に設けられたピン３２ａを軸中心にして回動可能となっている。よって、プローブ３１ａの先端部と可動部材３１ｂは、生体組織を挟持する挟持部を構成する。

さらに、処置ユニット２１の先端部には、生理食塩水を送出するための開口部２１ａが設けられており、開口部２１ａは、シース部３２内に挿通されたチューブ２１ｂに接続されている。図１の点線の矢印ａで示すように、処置部３１のプローブ３１ａと可動部材３１ｂの間の挟持部分に向かって、生理食塩水が送出されて滴下できるように、開口部２１ａとチューブ１２ｂは配設されている。よって、開口部２１ａは、処置部３１に設けられ、送液管路であるチューブ２１ｂからの生理食塩水を生体組織と処置部３１の間に送出するための送液口である。

ハンドルユニット２２内にも挿通されたチューブ２１ｂの基端部は、送液チューブ２５と接続され、チューブ２１ｂと、送液チューブ２５は連通している。後述するように、送液ユニット１３から送出された液体である生理食塩水が、送液チューブ２５とチューブ２１ｂとを通り、開口部２１ａから出射可能に、処置具１１は構成されている。よって、送液チューブ２５とチューブ２１ｂが、生理食塩水を送出するための送液管路を構成する。

また、処置ユニット２１の先端部には、生理食塩水を吸引するための開口部２１ｃが設けられており、開口部２１ｃは、シース部３２内に挿通されたチューブ２１ｄに接続されている。ハンドルユニット２２内にも挿通されたチューブ２１ｄの基端部は、吸引チューブ２６と接続され、チューブ２１ｄと、吸引チューブ２６は連通している。後述するように、吸引ユニット１４により、生理食塩水を、吸引チューブ２６とチューブ２１ｄとを介して、開口部２１ｃから吸引可能に、処置具１１は構成されている。よって、吸引チューブ２６とチューブ２１ｄが、生理食塩水を吸引するための吸引管路を構成する。

そして、開口部２１ａは、処置部３１に設けられ、送液管路であるチューブ２１ｂからの生理食塩水を送出するための送液口である。開口部２１ｃは、処置部３１に設けられ、吸引管路であるチューブ２１ｄ内に生理食塩水を吸引するための吸引口である。

ハンドルユニット２２は、筒状の胴体部３４の先端側に回転ノブ３５を有する。術者は、回転ノブ３５を胴体部３４の軸周りに回すことによって、処置部３１のプローブ３１ａの向きを変えることができる。

胴体部３４の基端部には、振動子ユニット２３が装着されている。振動子ユニット２３は、プローブ３１ａに接続されている。振動子ユニット２３は、内部に、超音波振動子（図示せず）を有し、プローブ３１ａを超音波振動させることができるようになっている。

胴体部３４は、ハンドル部３６を有し、ハンドル部３６は、固定ハンドル３６ａと可動ハンドル３６ｂを含む。ハンドル部３６は、生体組織を挟持するための操作ハンドルである。術者は、可動ハンドル３６ｂを固定ハンドル３６ａに対して近づくように、すなわちハンドル部３６を閉じるように操作すると、処置部３１の可動部材３１ｂを回動して、プローブ３１ａと可動部材３１ｂの間に生体組織を挟持することができる。

さらに、胴体部３４には、出力操作用の複数のスイッチ３７が設けられている。よって、術者は、ハンドル部３６を把持しながら操作して、処置部３１のプローブ３１ａの先端部と可動部材３１ｂによって生体組織を挟持した状態で、スイッチ３７をオン操作することによって、超音波振動出力、高周波電流出力あるいは超音波振動と高周波電流の同時出力による処置を行うことができる。

電源ユニット１２は、制御装置であり、後述するように、制御部を含み、術者によるスイッチ３７の操作に応じて、超音波振動出力及び高周波電流出力、送液及び吸引の制御を行う。

送液ユニット１３は、電源ユニット１２と信号ケーブル１３ａにより接続されている。また、送液ユニット１３は、送液用の送液チューブ２５により処置具１１と接続されており、送液ユニット１３から処置具１１へ生理食塩水を送出可能となっている。

吸引ユニット１４は、電源ユニット１２と信号ケーブル１４ａにより接続されている。また、吸引ユニット１４は、吸引用の吸引チューブ２６により処置具１１と接続されており、吸引ユニット１４により、開口部２１ｃから生理食塩水を吸引可能となっている。

図２は、電源ユニット１２、送液ユニット１３及び吸引ユニット１４の構成を示すブロック図である。電源ユニット１２は、処置具１１のエネルギー出力を制御する制御装置である。電源ユニット１２は、操作設定部としての操作パネル４０，制御部としての中央処理装置（以下、ＣＰＵという）４１，記憶部４２、超音波振動出力のための振動子ユニット２３を駆動する駆動信号を出力する超音波出力部（以下、ＵＳ出力部という）４３、高周波電流出力のための高周波電流信号を出力する高周波出力部（以下、ＨＦ出力部という）４４、及びインピーダンス検出部４５を含んでいる。

ＣＰＵ４１は、上述したように、超音波振動出力、高周波電流出力あるいは超音波振動と高周波電流の同時出力の制御を行う。その制御は、ＣＰＵ４１が記憶部４２に記憶された制御プログラムを実行することによって行われる。

記憶部４２は、その制御プログラムを記憶するＲＯＭ、プログラム実行時の作業用記憶領域としてのＲＡＭ、及び後述する送液時間の情報を記憶する、書き換え可能な不揮発性のメモリなどを含んでいる。

ＵＳ出力部４３は、ＣＰＵ４１からの超音波出力制御信号に基づいて、プローブ３１ａを超音波振動させるための駆動信号を、信号ケーブル２４を介して処置具１１へ出力する。

ＨＦ出力部４４は、ＣＰＵ４１からの高周波出力制御信号に基づいて、処置部３１にバイポーラの高周波出力を供給するための高周波電流信号を、信号ケーブル２４を介して処置具１１へ出力する。

よって、ＵＳ出力部４３及びＨＦ出力部４４は、それぞれ処置部３１に超音波振動及び高周波電流を与えるためのエネルギーを発生するエネルギー発生部である。

インピーダンス検出部４５は、プローブ３１ａと可動部材３１ｂ間に挟持された生体組織のインピーダンスを検出するための回路である。すなわち、インピーダンス検出部４５は、処置部３１において生体組織を挟持する２つの挟持部材間のインピーダンスを検出する。インピーダンス検出部４５は、プローブ３１ａと可動部材３１ｂ間のインピーダンスに応じた検出信号を、ＣＰＵ４１へ供給する。

また、ＣＰＵ４１には、スイッチ３７からの操作信号も入力される。なお、ここでは、後述するようにスイッチ３７が術者によって操作されることによって、エネルギー出力の指示が行われるが、エネルギー出力の指示は、フットスイッチなどによって行うようにしてもよい。

送液ユニット１３は、ポンプ駆動部４６と、ポンプ４７とを含む。ポンプ駆動部４６は、信号ケーブル１３ａを介して、ＣＰＵ４１からのポンプ駆動信号に基づいて、ポンプ４７を駆動する駆動信号を出力する駆動回路である。第１のポンプとしてのポンプ４７は、図示しないタンクに接続され、ポンプ駆動部４６からの駆動信号に基づいて駆動され、タンクに貯留された生理食塩水をチューブ２５へ供給する。ポンプ４７の吐出能力は、例えば、２０ｍｌ／ｍｉｎである。すなわち、ポンプ４７は、送液口である開口部２１ａから生理食塩水の液体を送出するために送液管路に生理食塩水を供給するためのポンプである。

吸引ユニット１４は、ポンプ駆動部４８と、ポンプ４９とを含む。ポンプ駆動部４８は、信号ケーブル１４ａを介して、ＣＰＵ４１からのポンプ駆動信号に基づいて、ポンプ４９を駆動する駆動信号を出力する駆動回路である。第２のポンプとしてのポンプ４９は、図示しないタンクに接続され、ポンプ駆動部４８からの駆動信号に基づいて駆動され、チューブ２６を介して吸引された生理食塩水をタンク（図示せず）に排出する。ポンプ４９の吸引能力は、例えば、２０ｍｌ／ｍｉｎである。すなわち、ポンプ４９は、吸引口である開口部２１ｃから吸引管路を介して生理食塩水の液体を吸引するためのポンプである。

ＣＰＵ４１は、スイッチ３７からの操作信号に応じて、ＵＳ出力部４３とＨＦ出力部４４を制御すると共に、ポンプ駆動部４６及び４８を制御する。

記憶部４２には、後述するポンプ４９により吸引される生理食塩水の吸引時間のデータが、予め設定されて記憶されている。

図３は、記憶部４２に記憶された、高周波出力時間Ｔｏと、吸引時間Ｔｓの関係を示す図である。高周波出力と送液ポンプ４７の駆動は、連動しているので、高周波出力時間Ｔｏに対して、吸引時間Ｔｓは比例関係を有している。よ

って、高周波出力時間Ｔｏが大きくなるにつれて、吸引時間Ｔｓが長くなるように、記憶部４２には、高周波出力時間Ｔｏに対する吸引時間Ｔｓが予め設定されて記憶されている。高周波出力時間Ｔｏに応じた吸引時間Ｔｓは、例えば、テーブルデータの形式で、記憶部４２に記憶される。後述するように、高周波出力時間Ｔｏは、ポンプ４７の駆動時間に等しい。

なお、高周波出力時間Ｔｏに応じた吸引時間Ｔｓは、ポンプ４７と４９の能力の違い、術者の要望に応じて、電源ユニット１２の操作パネル４０において、術者等が設定変更可能である。

すなわち、吸引時間Ｔｓは、エネルギーによる処置に送出された生理食塩水が吸引してなくなる状態にするのに必要な時間が設定される。

なお、図３では、吸引時間Ｔｓは、高周波出力時間Ｔｏに対して、線形的に比例して増加するように設定されているが、一点鎖線で示すように、段階的に増加するように設定してもよい。

図４と図５は、ＨＦ出力部４４、及びポンプ駆動部４６、４８を制御するＣＰＵ４１の処理の例を示すフローチャートである。図６は、高周波電流出力のための出力信号ＥＯＵＴと、ポンプ４７、４９のポンプ駆動信号ＰｉＯＵＴ、ＰｓＯＵＴのタイミングチャートである。

図４の処理は、スイッチ３７が押下されてオンされて、高周波電流のエネルギー出力が指示された時に、ＣＰＵ４１により実行される処理である。

スイッチ３７が押下されてエネルギー出力の指示を受けると、ＣＰＵ４１は、その指示されたエネルギー出力を行う（Ｓ１）。エネルギー出力が高周波電流出力の場合、所定のあるいは指示された出力でＨＦ出力部４４は駆動される。エネルギー出力と同時に、ＣＰＵ４１は、ポンプ駆動部４６にポンプ駆動信号ＰｉＯＵＴを出力して、送液用のポンプ４７を駆動する（Ｓ２）。図６において、出力信号ＥＯＵＴが時刻ｔ１でＨＩＧＨとなって、エネルギー出力と送液が開始される。

ＣＰＵ４１は、さらに、エネルギー出力と同時に、ソフトウエアカウンタなどを利用した計時を開始して、高周波電流の出力時間を計測する（Ｓ３）。

そして、ＣＰＵ４１は、スイッチ３７がオフされたか、すなわちエネルギー出力の停止がされたかを判定し（Ｓ４）、エネルギー出力の停止がされていないときには（Ｓ４：ＮＯ）、処理は、Ｓ１に戻る。エネルギー出力の停止がされたとき（Ｓ４：ＹＥＳ）、ＣＰＵ４１は、出力時間の計測を停止し（Ｓ５）、ポンプ駆動信号ＰｉＯＵＴの出力を停止して、送液用のポンプ４７を停止する（Ｓ６）。

そして、ＣＰＵ４１は、出力時間の計測のためのカウンタのカウント値から、エネルギー出力の出力時間を算出し、その算出された出力時間Ｔｏに基づいて、記憶部４２に記憶されている吸引時間Ｔｓを読み出す（Ｓ７）。例えば、図３において、出力時間Ｔｏがｔｏ１であると、吸引時間Ｔｓの値ｔｓ１が読み出される。

ＣＰＵ４１は、ポンプ駆動部４８にポンプ駆動信号ＰｓＯＵＴを出力し、ポンプ４９を駆動して、吸引を行う（Ｓ８）。その結果、処置具１１のシース部３２の先端部の開口部２１ｃから、ウージング出血の止血ために送液されて溜

まった生理食塩水が吸引される。図６では時刻ｔ２において、エネルギー出力と送液用のポンプ４７の駆動が停止され、かつ吸引が開始される。

なお、吸引用のポンプ４９の駆動は、エネルギー出力の停止後、所定の時間が経過してから行うようにしてもよい。例えば、エネルギー出力の停止後、術者がストレスを感じない程度の時間が経過した後に、ポンプ４９を駆動するようにしてもよい。術者がストレスを感じない程度の時間とは、例えば、０．５秒のタイムラグである。

ＣＰＵ４１は、さらに、吸引の開始と同時に、出力時間を計時のためのカウンタとは別のソフトウエアカウンタなどを利用した計時を開始して、吸引時間Ｔｓを計測する（Ｓ９）。

ＣＰＵ４１は、吸引をしているときに、スイッチ３７が操作されて、エネルギー出力の開始が指示されたか否かを判定する（Ｓ１０）。エネルギー出力が開始されると（Ｓ１０：ＹＥＳ）、ＣＰＵ４１は、ポンプ駆動部４８へのポンプ駆動信号ＰｓＯＵＴの出力を止め、ポンプ４９を停止して吸引を停止し（Ｓ１１）、処理は、Ｓ１に戻る。すなわち、ＣＰＵ４１は、エネルギーの出力停止後に、エネルギー発生部であるＨＦ出力部４４に対するエネルギーの発生指示を受けると、ポンプ４９を停止させ、術者による操作指示を優先する。

エネルギー出力が開始されないとき（Ｓ１０：ＮＯ）、吸引を開始してからの経過時間が、読み出された吸引時間Ｔｓを経過したか否かが判定される（Ｓ１２）。ＣＰＵ４１は、吸引を開始してからの時間が、読み出された吸引時間Ｔｓを経過したか否かを判定する。吸引を開始してからの経過時間が、記憶部４２から読み出された吸引時間Ｔｓを経過していないときは（Ｓ１２：ＮＯ）、処理は、Ｓ８に戻り、吸引は続けられる。

吸引を開始してからの経過時間が吸引時間Ｔｓを経過すると（Ｓ１２：ＹＥＳ）、ＣＰＵ４１は、ポンプ駆動部４８へのポンプ駆動信号ＰｓＯＵＴの出力を停止し、吸引を停止し（Ｓ１３）、出力時間と吸引時間を係止するために用いられた２つのカウンタをクリアにする（Ｓ１４）。図６では時刻ｔ３において、吸引が停止されている。

すなわち、制御部であるＣＰＵ４１は、エネルギー発生部であるＨＦ出力部４４からのエネルギーの出力停止に連動して、エネルギーの出力停止後、所定の時間だけ、ポンプ４９により生理食塩水の吸引を行うように、ポンプ４９を制御する。具体的には、ＣＰＵ４１は、エネルギーの出力停止に応じて、エネルギー出力時間あるいは送液時間に応じた吸引時間だけ、ポンプ４９による生理食塩水の吸引を行うように、ポンプ４９の駆動を開始し、所定の時間だけ、ポンプ４９による生理食塩水の吸引を行った後、ポンプ４９を停止するように、制御する。

その結果、設定された吸引時間Ｔｓの間、吸引が行われるので、エネルギーによる処置時に送液されて溜まった生理食塩水を、溜まった分だけ吸引される。すなわち、術者は、助手によらずに、ウージング出血に対する止血のための処置により体内に溜まった生理食塩水が吸引されるので、助手を要せずに、かつ助手の操作する吸引管による視界の妨げもなく、溜まった生理食塩水の除去が行われ、術者は、手術を迅速に続けることができる。

以上のように、上述した本実施の形態の手術装置１によれば、ウージング出血に対する処置などを行った場合に、体内に溜まった生理食塩水が迅速に除去されるので、術者は、迅速に手術を続けることができる。結果として、手術時間の短時間に繋がる。

（第２の実施の形態）

上述した第１の実施の形態では、エネルギー出力の停止に連動して、ＣＰＵ４１がポンプ４９を駆動して吸引が開始されるが、第２の実施の形態では、ハンドル部３６における挟持操作に応じて、吸引チューブ２６あるいは吸引チューブ２１ｄを機械的に押圧することによって吸引を規制し、その挟持操作が解除されると、吸引が開始される。

図７は、本実施の形態に係る手術装置１Ａの構成を説明するための図である。図７において、図１と同じ構成要素については、同じ符号を付して説明は省略する。ここでは、エネルギー出力の指示がされているとき、ハンドル部３６Ａは、閉じられるように、操作される。

手術装置１Ａにおいて、処置具１１Ａの可動ハンドル３６ｂ１は、ハンドル部３６Ａが閉じると、吸引チューブ２１ｄに当接して、変形させるための突起部５１を有する。また、固定ハンドル３６ａ内には、突起部５１によって変形される吸引チューブ２１ｄを受ける受け部材５２が固定して設けられている。

すなわち、ハンドル部３６Ａが閉じられて、図７において実線の矢印ｂで示す方向に、可動ハンドル３６ｂ１が移動すると、突起部５１は、固定ハンドル３６ａ内において吸引チューブ２１ｄを受け部材５２に対して機械的に押圧して、吸引チューブ２１ｄによる、ポンプ４９からの吸引を止めるように、吸引チューブ２１ｄを変形させる。術者が、ハンドル部３６Ａを開くと、吸引チューブ２１ｄは突起部５１からの力を受けなくなり、吸引チューブ２１ｄ内を生理食塩水が流れる。

よって、ハンドル部３６Ａにおける突起部５１と受け部材５２は、吸引チューブ２１ｄの途中に配置され、操作ハンドルである可動ハンドル３６に対する操作に応じて、吸引チューブ２１ｄ内を吸引される液体の流れを規制する液体吸引規制機構を構成する。

電源ユニット１２、送液ユニット１３及び吸引ユニット１４の構成は、図２に示す構成と同様である。ＣＰＵ４１の処理の内容が、第１の実施の形態の処理と異なる。

図８及び図９は、ＨＦ出力部４４及びポンプ駆動部４６、４８を制御するＣＰＵ４１の処理の例を示すフローチャートである。図８及び図９において、図４及び図５と同じ処理については、同じ符号を付して、説明は簡略に行う。図８及び図９は、図４及び図５の処理の順番等が異なる。図１０は、高周波電流出力のための出力信号ＥＯＵＴと、ポンプ４７のポンプ駆動信号ＰｉＯＵＴと、ポンプ４９のポンプ駆動信号ＰｓＯＵＴと、開口部２１ｃからの生理食塩水の吸引のタイミングチャートである。

図８では、スイッチ３７が押下されてエネルギー出力の指示を受けると、ＣＰＵ４１は、その指示されたエネルギー出力を行い（Ｓ１）、続いて、ポンプ駆動部４６に駆動信号を出力し、ポンプ４７を駆動して、送液を行う（Ｓ２）。

そして、ＣＰＵ４１は、ポンプ駆動部４８にポンプ駆動信号ＰｓＯＵＴを出力し、ポンプ４９を駆動して、吸引を行う（Ｓ８）。

エネルギー出力の指示がされているとき、ハンドル部３６Ａは、閉じられているので、突起部５１は、送液チューブ２１ｄを変形させている。よって、ポンプ４９が駆動されても、ポンプ４９による吸引は行われない。図１０において、出力信号ＥＯＵＴが時刻ｔ１１で出力を開始しているが、生理食塩水の吸引はされない。

Ｓ８の後、ＣＰＵ４１は、出力時間の計測を開始し（Ｓ３）、続いて、エネルギー出力の停止がされたかを判定する（Ｓ４）。

エネルギー出力の停止が指示されていないときには（Ｓ４：ＮＯ）、処理は、Ｓ１に戻る。スイッチ３７の押下されなくなってエネルギー出力の停止が指示されたとき（Ｓ４：ＹＥＳ）、ＣＰＵ４１は、出力時間の計測を停止し（Ｓ５）、送液用のポンプ４７を停止し（Ｓ６）、計測された出力時間に応じた、記憶部４２に記憶されている吸引時間Ｔｓを読み出す（Ｓ７）。

エネルギー出力の停止に伴い、術者がハンドル部３６Ａを開くと、突起部５１が吸引チューブ２１ｄを押圧しなくなるので、吸引が開始される。その結果、処置具１１のシース部３２の先端部の開口部２１ｃから生理食塩水が吸引される。図１０では時刻ｔ１２において、エネルギー出力の停止がされ、かつ吸引が開始される。

ＣＰＵ４１は、エネルギー出力の停止後、吸引時間の計測を開始する（Ｓ９）。ＣＰＵ４１は、吸引をしているときに、スイッチ３７が操作されて、エネルギー出力の開始が指示されたか否かを判定し（Ｓ１０）、エネルギー出力が開始されると（Ｓ１０：ＹＥＳ）、ハンドル部３６Ａは閉じられて、処理は、Ｓ１に戻る。これも、第１の実施の形態と同様に、術者による操作指示を優先するためである。

エネルギー出力が開始されないとき（Ｓ１０：ＮＯ）、エネルギー出力の停止がされてからの時間が、読み出された吸引時間Ｔｓを経過したか否かが判定され（Ｓ１２）、吸引を開始してからの経過時間が吸引時間Ｔｓを経過していないときは（Ｓ１２：ＮＯ）、処理は、Ｓ９に戻り、吸引は続けられる。

吸引を開始してからの経過時間が吸引時間Ｔｓを経過すると（Ｓ１２：ＹＥＳ）、ＣＰＵ４１は、ポンプ駆動部４８へのポンプ駆動信号ＰｓＯＵＴの出力をしないで、吸引を停止し（Ｓ１３）、処理を終了する。図１０では時刻ｔ１３において、吸引が停止されている。

よって、本実施の形態によっても、吸引が設定された送液時間Ｔｓの間行われるので、ウージング出血に対する処置により体内に溜まった生理食塩水は、エネルギー出力後に吸引される。

以上のように、上述した本実施の形態の手術装置１Ａによれば、ウージング出血に対する処置などを行った場合に、体内に溜まった生理食塩水が吸引されるので、助手を要せずに、かつ助手の操作する吸引管による視界の妨げもなく、溜まった生理食塩水の除去が行われ、術者は、迅速に手術を続けることができる。

なお、上記の例では、エネルギー出力のためのスイッチ３７の操作とハンドル部３６Ａの開閉動作は、独立しているが、ハンドル部３６Ａにスイッチを設け、ハンドル部３６Ａの可動ハンドル３６ｂ１の操作によりスイッチが閉じると、スイッチがオンになって、エネルギー出力の指示信号が発生するようにしてもよい。例えば、図７において、括弧書きで示すように、可動ハンドル３６ｂ１に、突起部５１とは別の突起部５３を設け、固定ハンドル３６ａに、ハンドル部３６Ａを閉じたときに突起部５３によって押下されるスイッチ５４が設けられている。

このような構成によれば、エネルギー出力のためのスイッチの操作とハンドル部３６Ａの開閉動作とを連動させることができる。

以上のように、上述した各実施の形態の手術装置によれば、ウージング出血に対する処置などを行った場合に、体内に溜まった生理食塩水が迅速に除去されるので、術者は、迅速に手術を続けることができる。

上述した各実施の形態の手術装置は、特に、肝臓実質に対するエネルギー処置に有効である。膜に包まれた肝臓実質の場合、ウージング出血が発生し易い。そのような場合に、上述した各実施の形態の手術装置によれば、処置のためのエネルギー出力の終了後に生理食塩水が迅速に除去されるので、術者は、迅速に手術を続けることができる。

なお、各実施の形態の手術装置は、肝臓実質だけでなく、血管等の他の臓器などに対しても適用可能であり、有効である。

（変形例１）

上述した２つの実施の形態では、エネルギー出力の終了後、吸引を所定の時間行うようにしているが、吸引は、所定の時間に代えて、所定の量だけ行うようにしてもよい。すなわち、エネルギー処置時の出力時の出力時間または送液時間に応じた所定の量の液体を、吸引するように、ＣＰＵ４１は、ポンプ４９を制御してもよい。

その場合も、所定の量すなわち吸引量の情報は、記憶部４２に記憶され、上述した２つの実施の形態のように、計測された出力時間又は送液時間に応じて異なるように設定される。さらに、その記憶部４２に記憶された送液量の値は、術者が設定変更可能である。

（変形例２）

上述した２つの実施の形態及び上記変形例１では、吸引時間あるいは吸引量は、エネルギー出力時間又は送液時間に応じて記憶部４２に予め設定された吸引時間あるいは吸引量であるが、吸引時間等の吸引のパターンを、インピーダンス検出部４５により検出されたプローブ３１ａと可動部材３１ｂ間に挟持された生体組織のインピーダンスの値に応じて、変更するようにしてもよい。

（変形例３）

上述した２つの実施の形態及び上記変形例１では、吸引時間あるいは吸引量は、エネルギー出力時間又は送液時間に応じて記憶部４２に予め設定された吸引時間あるいは吸引量であるが、術者が操作パネル４０において、吸引時間あるいは吸引量を設定し、エネルギー出力時間又は送液時間に拘わらず、その設定された吸引時間あるいは吸引量だけ、吸引するようにしてもよい。

よって、ＣＰＵ４１は、エネルギー出力の終了後、その設定された吸引時間あるいは吸引量だけ、吸引するように、ポンプ４９を制御する。

（変形例４）

上述した２つの実施の形態及び各変形例では、送液チューブ２１ｂと吸引チューブ２１ｄがそれぞれ処置具１１，１１Ａ内に設けられているが、チューブをシース部３２内に設けることは、シース部３２の径が太くなるという問題がある。そこで、送液チューブ２１ｂと吸引チューブ２１ｄの少なくとも一方を、シース部３２内のインナーパイプとアウターパイプの間の空間、あるいはインナーパイプとプローブ３１ａの間の空間で代替するようにしてもよい。

その場合、インナーパイプとアウターパイプのそれぞれの内側と外側を、絶縁材料でコーティングを行う。生理食塩水がインナーパイプとアウターパイプの間あるいはインナーパイプとプローブ３１ａの間に存在しても、電気的な導通が発生しないようにするためである。

例えば、プローブ３１ａの外側に生理食塩水を流す場合、プローブ３１ａとインナーパイプ間の電気的短絡が防止可能となる。さらに、インナーパイプとアウターパイプの間に生理食塩水を流す場合、インナーパイプとアウターパイプの間の電気的短絡が防止可能となる。

インナーパイプとアウターパイプの内側の絶縁材料のコーティングは、それぞれのパイプの内側に噴射式とノズルを挿入し、ノズルをパイプの内部で移動させながら、ノズルから絶縁材料を噴射することによって行うことができる。

このような構成によれば、シース部３２の径を太くすることなく、生理食塩水を処置部３１へ供給することができる。また、上記のような絶縁性コーティングを行うことは、インナーパイプがシザース形状タイプの駆動軸である場合には、アウターパイプとの摺動抵抗を低下させることにも繋がる。

本発明は、上述した実施の形態に限定されるものではなく、本発明の要旨を変えない範囲において、種々の変更、改変等が可能である。

WHAT IS CLAIMED IS:

【請求項１】

生体組織を処置するための処置部と、

前記処置部に高周波電流を与えるためのエネルギー発生部と、

前記生体組織に液体を送出するための送液管路と、

前記液体を吸引するための吸引管路と、

前記エネルギー発生部の高周波電流を制御するための高周波出力制御信号を出力するエネルギー制御部と、

前記エネルギー制御部の前記高周波出力制御信号の出力命令に応じて、前記高周波電流が出力されている間、前記送液管路から前記液体を送出するとともに、前記高周波出力制御信号の停止命令に応じて、前記送液管路からの前記液体の送出を停止する第１のポンプ駆動部と、

前記エネルギー制御部の前記高周波出力制御信号の停止命令に応じて、所定の時間若しくは所定の量だけ、前記吸引管路から前記液体の吸引を行うとともに、前記所定の時間もしくは所定の量の吸引の後に前記吸引管路から前記液体の吸引を停止する第２のポンプ駆動部と、

を有することを特徴とする手術装置。

【請求項２】

前記所定の時間若しくは前記所定の量は、記憶部に記憶され、かつ設定変更可能であることを特徴とする請求項１に記載の手術装置。

【請求項３】

前記所定の時間若しくは前記所定の量は、前記エネルギーの出力時間又は前記第１のポンプの駆動時間に応じて設定されることを特徴とする請求項１に記載の手術装置。

【請求項４】

前記エネルギー制御部は、前記エネルギーの出力停止後に前記エネルギー発生部に対する前記エネルギーの発生指示を受けると、前記第２のポンプを停止することを特徴とする請求項１に記載の手術装置。

【請求項５】

前記エネルギー制御部は、前記高周波出力制御信号の出力停止に応じて、前記第２のポンプによる前記液体の吸引を行うように、前記第２のポンプの駆動を開始し、前記所定の時間若しくは前記所定の量だけ、前記第２のポンプによる前記液体の供給を行った後、前記ポンプを停止するように制御することを特徴とする請求項１に記載の手術装置。

【請求項６】

前記吸引管路の途中に配置され、操作ハンドルに対する操作に応じて、前記吸引管路に流れる前記液体の吸引を規制する液体吸引規制機構を、さらに有することを特徴とする請求項１に記載の手術装置。

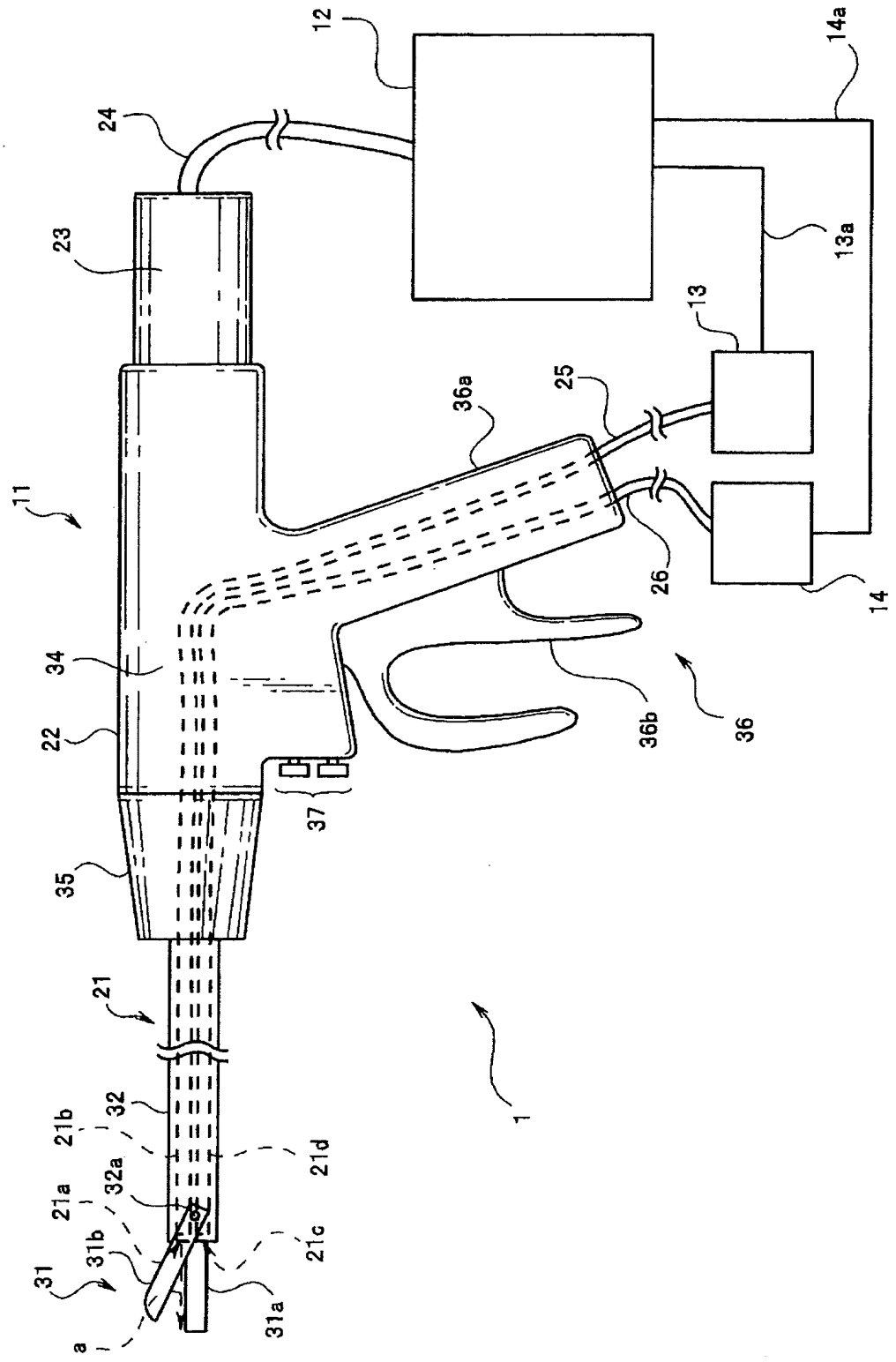
【請求項７】

前記処置部において前記生体組織を挟持する２つの挟持部材間のインピーダンスを検出するインピーダンス検出部を有し、

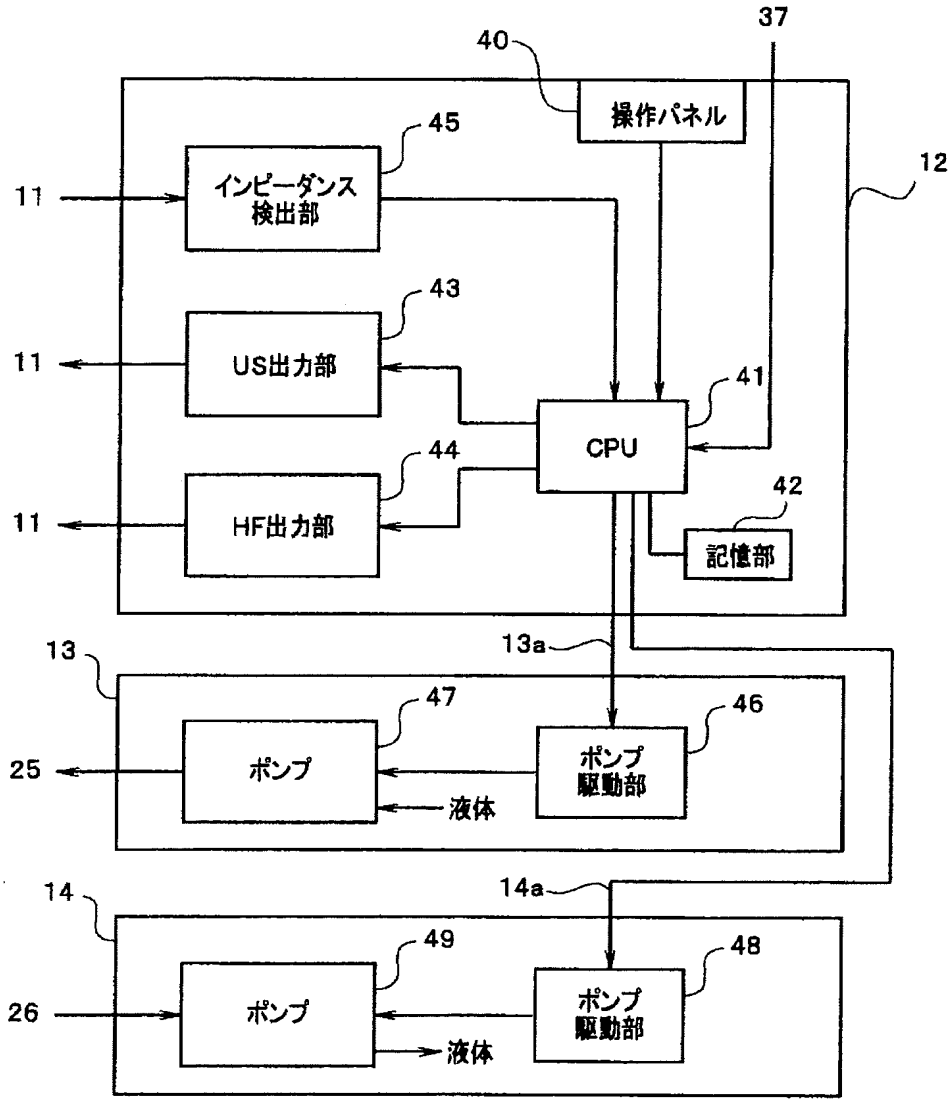
前記所定の時間若しくは前記所定の量は、前記インピーダンス検出部において検出されたインピーダンスに応じて異なることを特徴とする請求項１に記載の手術装置。

ABSTRACT OF THE DISCLOSURE
手術装置は、生体組織を処置するための処置部と、前記処置部に高周波電流を与えるためのエネルギー発生部と、前記生体組織に液体を送出するための送液管路と、前記液体を吸引するための吸引管路と、 前記エネルギー発生部の高周波電流を制御するための高周波出力制御信号を出力するエネルギー制御部と、前記高周波出力制御信号の出力命令に応じて、前記高周波電流が出力されている間、前記送液管路から前記液体を送出するとともに、前記高周波出力制御信号の停止命令に応じて、前記送液管路からの前記液体の送出を停止する第 1 のポンプ駆動部と、前記高周波出力制御信号の停止命令に応じて、所定の時間若しくは所定の量だけ、前記吸引管路から前記液体の吸引を行うとともに、前記所定の時間もしくは所定の量の吸引の後に前記吸引管路から前記液体の吸引を停止する第 2 のポンプ駆動部と、を有する。

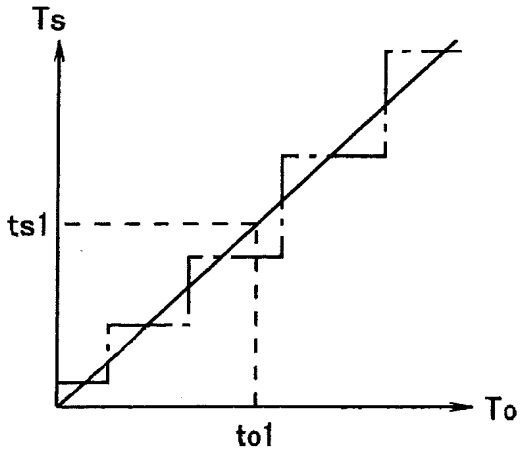
[図1]


12
14a
24
23
13a
13
36a
25
11
26
14
34
36b
36
22
37
35
21
1
32
21b
21d
32a
21a
31b
21c
31
31a
a

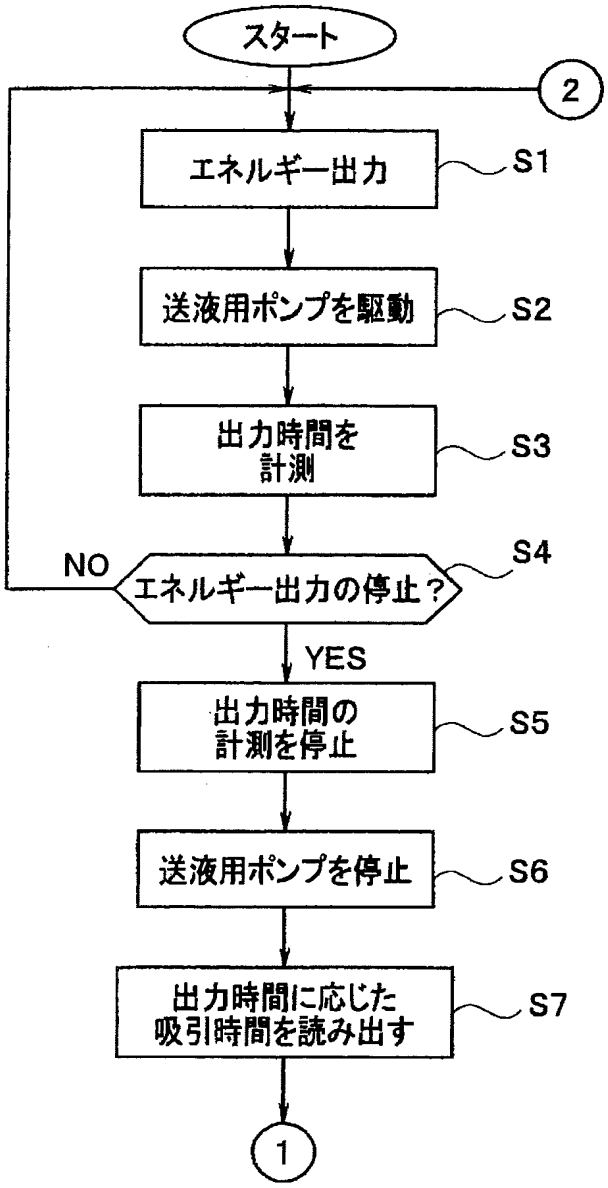
[図2]


40
37
操作パネル
45
インピーダンス
検出部
11
12
43
11
US出力部
41
CPU
44
42
11
HF出力部
記憶部
13
13a
47
46
25
ポンプ
ポンプ
駆動部
液体
14
14a
49
48
26
ポンプ
ポンプ
駆動部
液体

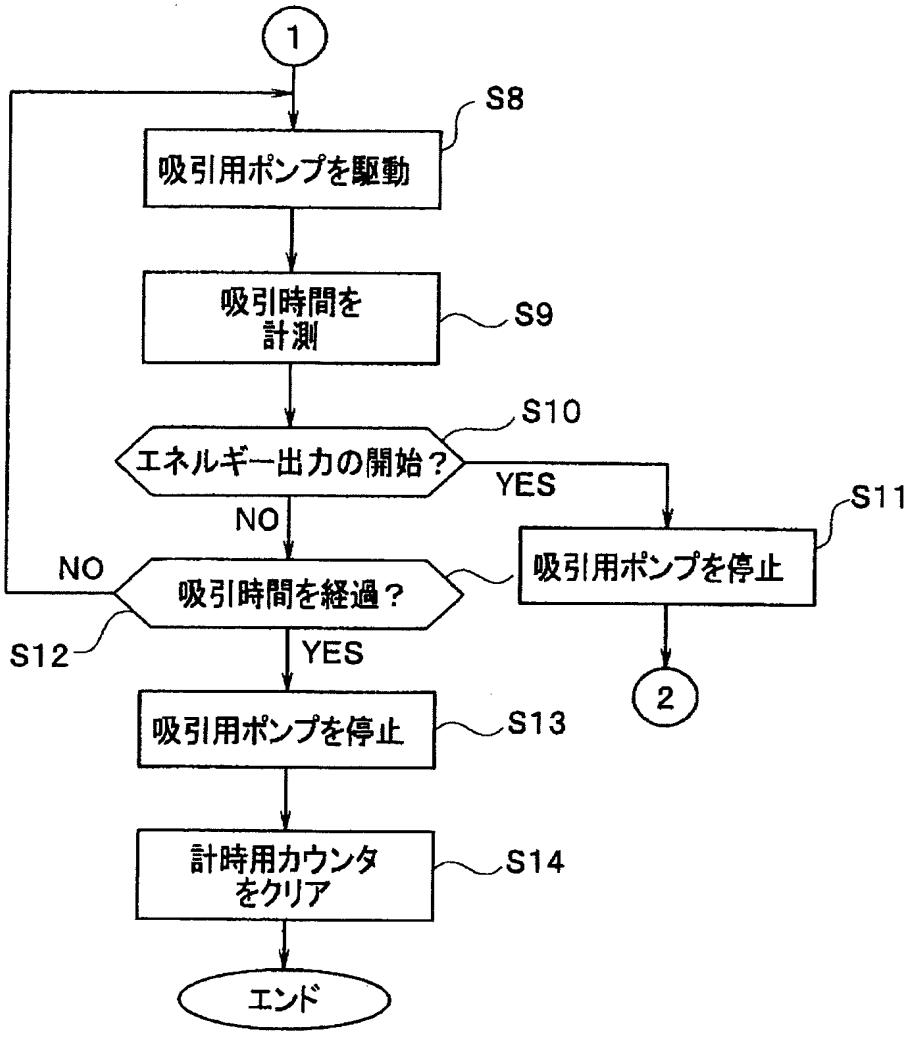
[図3]


Ts
ts1
To
to1

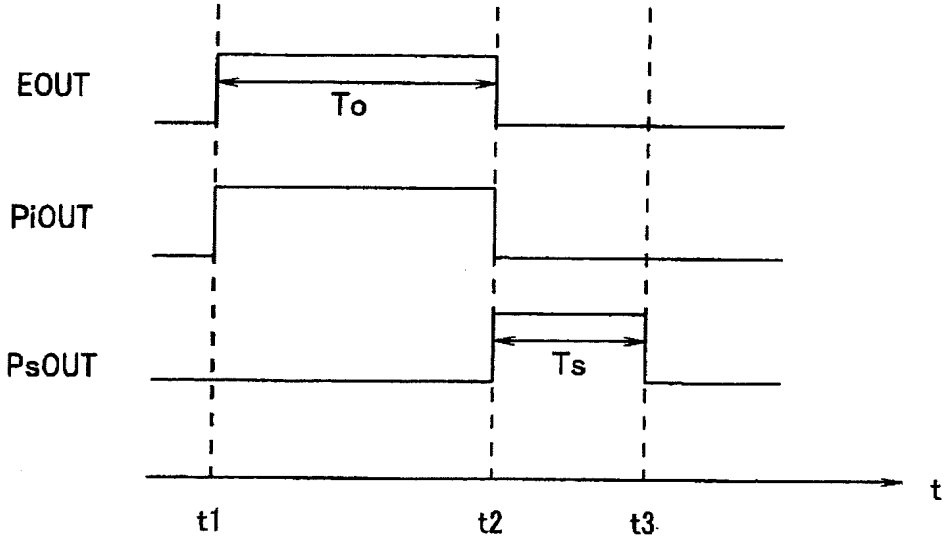
[図4]


スタート
2
エネルギー出力
S1
送液用ポンプを駆動
S2
出力時間を
計測
S3
NO
エネルギー出力の停止？
S4
YES
出力時間の
計測を停止
S5
送液用ポンプを停止
S6
出力時間に応じた
吸引時間を読み出す
S7
1

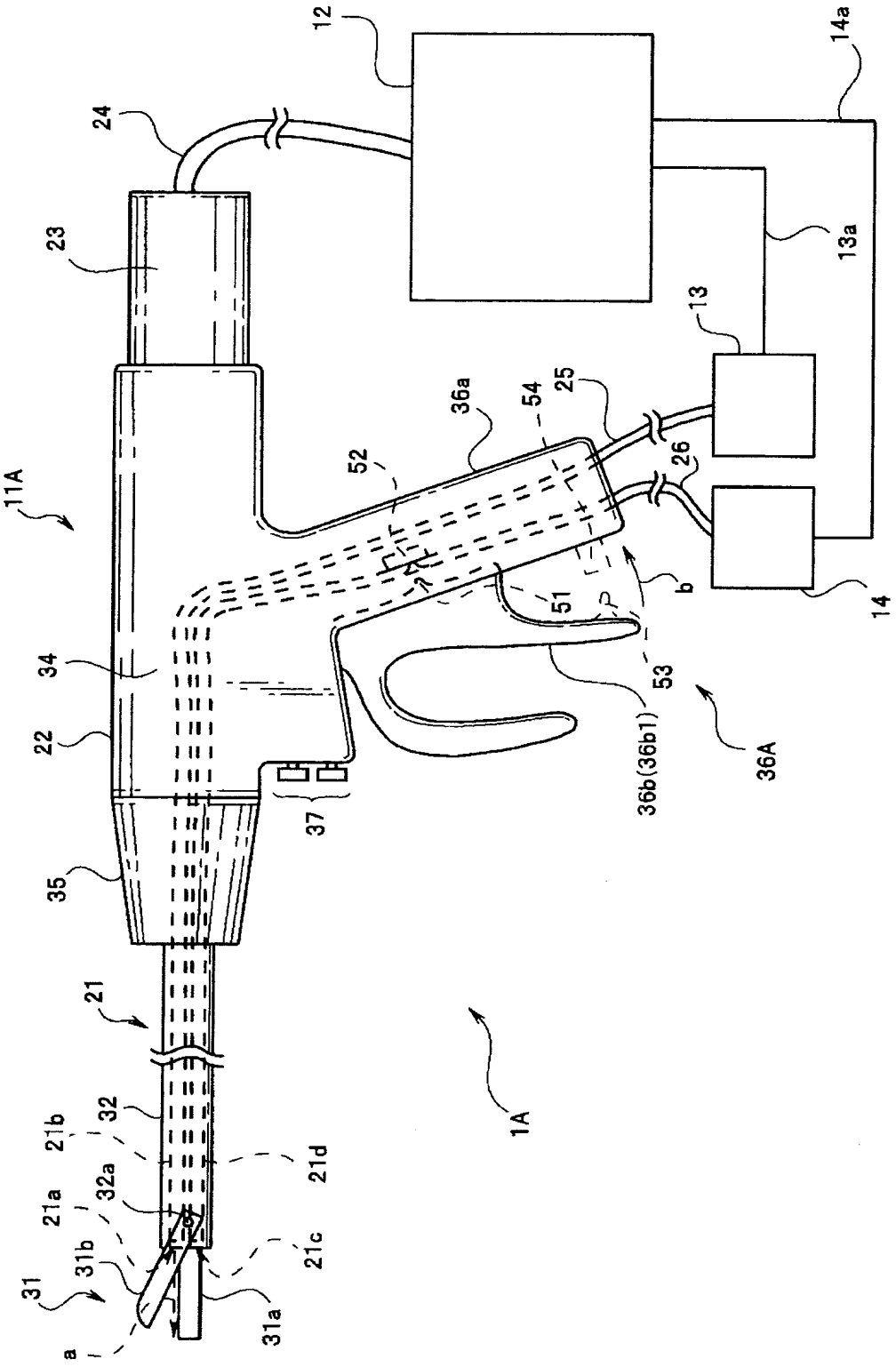
[図5]


1
S8
吸引用ポンプを駆動
吸引時間を
計測
S9
S10
エネルギー出力の開始？
YES
S11
NO
吸引用ポンプを停止
NO
吸引時間を経過？
S12
YES
2
吸引用ポンプを停止
S13
計時用カウンタ
をクリア
S14
エンド

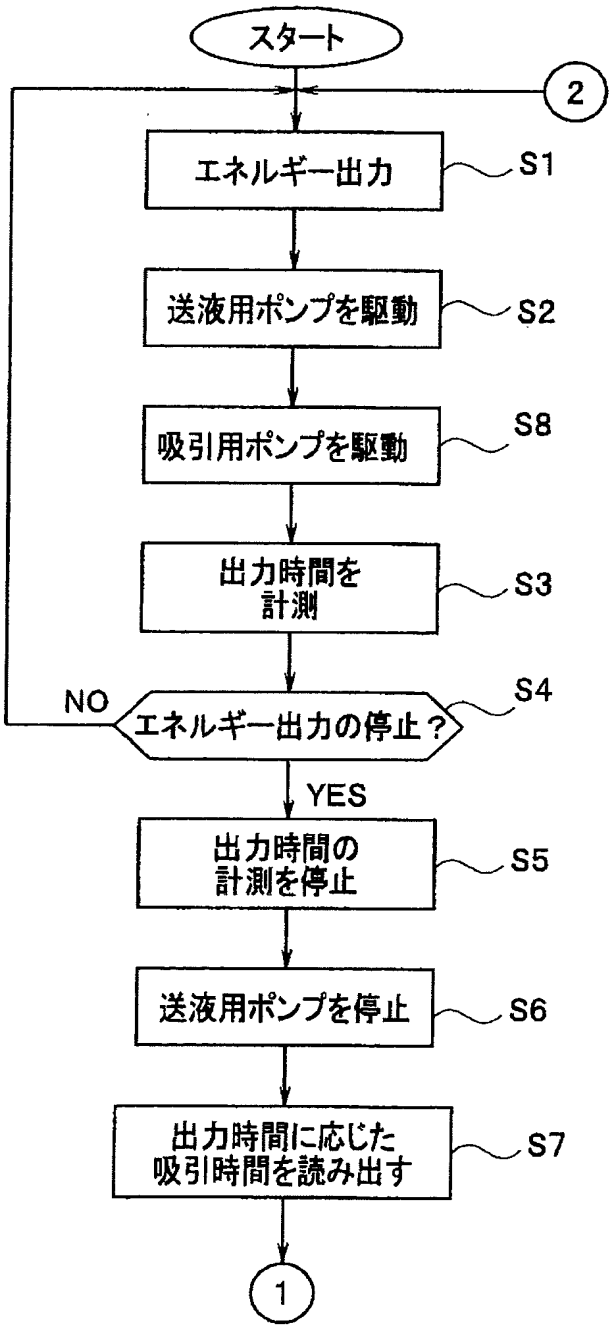
[図6]


EOUT
To
PiOUT
PsOUT
Ts
t
t1
t2
t3

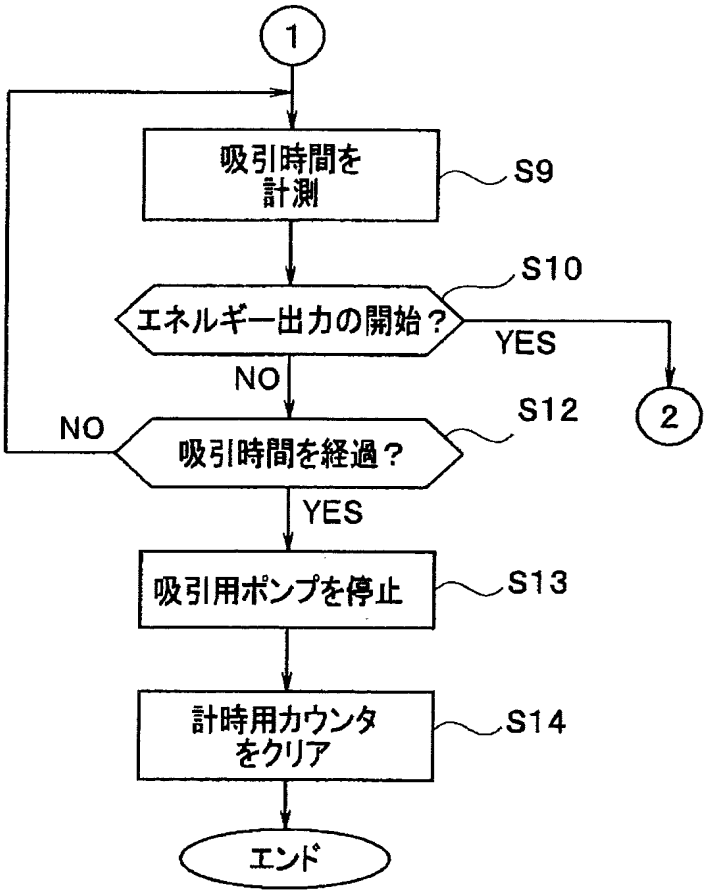
[図7]


12
14a
24
23
13a
13
36a
54
25
52
26
11A
b
51
14
34
53
36b(36b1)
36A
22
37
35
21
1A
32
21b
21d
32a
21a
31b
21c
31
31a
a

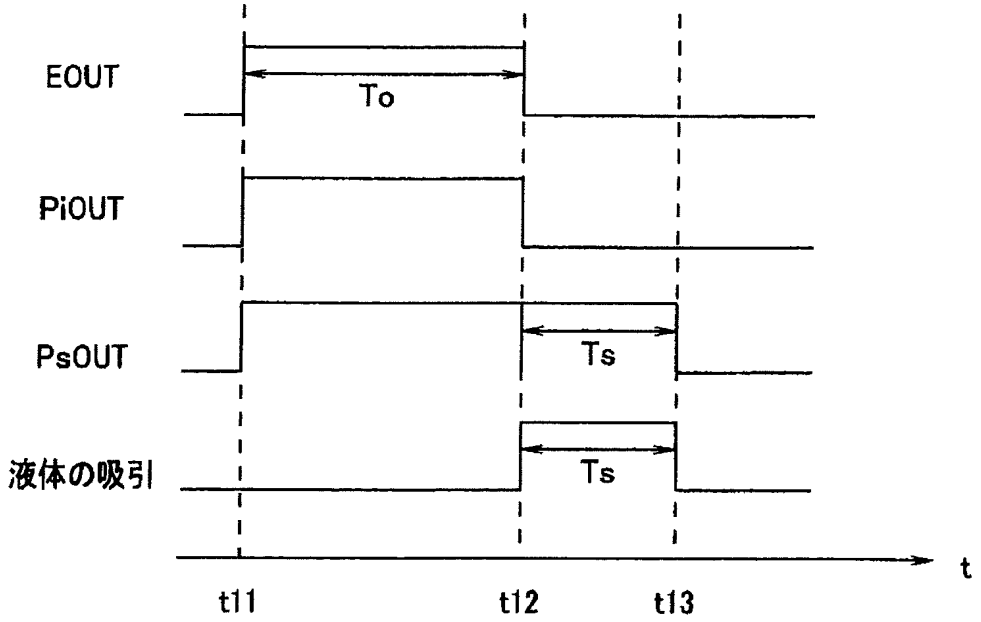
[図8]


スタート
2
エネルギー出力
S1
送液用ポンプを駆動
S2
吸引用ポンプを駆動
S8
出力時間を
計測
S3
NO
エネルギー出力の停止？
S4
YES
出力時間の
計測を停止
S5
送液用ポンプを停止
S6
出力時間に応じた
吸引時間を読み出す
S7
1

[図9]


1
吸引時間を
計測
S9
S10
エネルギー出力の開始？
YES
NO
2
NO
S12
吸引時間を経過？
YES
吸引用ポンプを停止
S13
計時用カウンタ
をクリア
S14
エンド

[図10]


EOUT
To
PiOUT
PsOUT
Ts
液体の吸引
Ts
t
t11
t12
t13

PTO/AIA/01 (06-12)
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申請データシート(37 CFR 1.76)を使った実用及び意匠登録出願宣誓書(37 CFR 1.63)
DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

発明の名称 Title of Invention	SURGICAL DEVICE

下記発明者である私は、つぎのことがらを宣誓します。
As the below named inventor, I hereby declare that:

本宣誓は This declaration is directed to:

☐ 添付されている、あるいは The attached application, or

☐ 米国出願、あるいは_____に出願されたPCT国際出願番号_____として出願されているものに宛てられています。
United States application or PCT international application number _____ filed on _____.

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The above-identified application was made or authorized to be made by me.

私は本出願書中にあらわれるもともとの発明者、あるいはもともとの共同発明者です。
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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発明者の正式氏名
LEGAL NAME OF INVENTOR

発明者: _____ 日付(任意): _____
Inventor: Hideo SANAI Date (Optional): _____

署名: Hideo Sanai
Signature: _____

備考: 出願データシート(PTO/AIA/14 あるいはその同等用紙) は、発明の自主独立体全体の命名を含め、本用紙に添付され、あるいは前もって出願がなされていること。なお残余の発明者ごとにPTO/AIA/01 用紙を使用する。
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Doc Code: PA..
Document Description: Power of Attorney

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Application Number	New U.S. Patent Application
Filing Date	January 24, 2014
First Named Inventor	Hideo SANAI
Title	SURGICAL DEVICE
Art Unit	N/A
Examiner Name	N/A
Attorney Docket Number	153190

SIGNATURE of Applicant or Patent Practitioner

Signature	/Todd M. Guise/ for James A. Oliff	Date (Optional)	2014-01-24
Name	Todd M. Guise	Registration Number	46748
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

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☑ *Total of 1 forms are submitted.

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POWER OF ATTORNEY BY APPLICANT

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あるいは
OR

25944

☐ 私は下記の特許弁護士を、私/私たちの弁護士あるいは代理人と指名し、添付の伝送書（(書式PTO/AIA/82A あるいはその同等書類)に記載されている出願に関連した米国特許商標局に対するすべての必要事項を遂行なさしめる。
I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

登録名 Name Registration	番号 Number		登録名 Name Registration	番号 Number

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The address associated with the above-mentioned Customer Number.

あるいは
OR

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The address associated with Customer Number:

または
OR

☐ 事務所または個人名 Firm or Individual Name					
住所 Address					
市町村名 City		州名 State		郵便番号 Zip	
国名 Country					
電話 Telephone		イーメール Email			

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

出願者による委任状
POWER OF ATTORNEY BY APPLICANT

私は出願者であり:
I am the Applicant:

- ☐ 発明者あるいは共同発明者である
  Inventor or Joint Inventor
- ☐ 死亡、あるいは禁治産者とされた発明者の法的代理人である
  Legal Representative of a Deceased or Legally Incapacitated Inventor
- ■ 被譲渡人あるいは発明者が譲渡する義務を負う人物である
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- ☐ 別面において十分な*独占的*所有権 (たとえば出願のなかで 37 CFR 1.46(b)(2) のもとにおける請願が出願のなかで受理された、あるいは本書類とともに申請がなされた場合)を有することを示した人物である)
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特許出願人の署名
SIGNATURE of Applicant for Patent

署名 Signature	A Suzuki	日付 Date	Apr. 30, 2013
姓名 Name	Akira Suzuki	電話 Telephone	
肩書きおよび会社 Title and Company	General Manager of Intellectual Property Department of Olympus Medical Systems Corp.		

注記: 署名:本書式は 37 CFR 1.33 にのっとり、出願者あるいは出願者の代理人の署名がなされていなければならない。署名およびその証明必要条件については 37 CFR 1.4 を参照のこと。署名がひとつ以上ある場合はその数の書式を提出すること。下記参照*。
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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideo SANAI

Application No.: New U.S. Patent Application

Filed: January 24, 2014 Docket No.: 153190

For: SURGICAL DEVICE

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 CFR §1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO-1449. Unless otherwise indicated herein, one copy of each reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

☒ 1. This Information Disclosure Statement is being filed (a) within three months of the U.S. filing date of this non-CPA application, OR (b) before the mailing date of a first Office Action on the merits in the present application. No certification or fee is required.

☒ 2. One or more reference cited herein was cited in the International Search Report. See References 7-10. An original and English language version of the International Search Report are attached for the Examiner's information as Reference 11.

☒ 3. In accordance with 37 CFR §1.98(a)(2)(ii), copies of any U.S. patents and patent application publications are not attached.

☒ 4. An English language Abstract of one or more non-English language reference is included. See References 7, 8 & 10.

☒ 5. A computer-generated English language translation of one or more references cited herein has been obtained and is attached, but has not been reviewed for accuracy. See References 7-10.

☒ 6. References 4-6 correspond to References 7, 10 & 9, respectively.

Respectfully submitted,

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JAO:TMG/OZH/cck

Date: January 24, 2014

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Modified Form PTO-1449 (REV. 07/09) PATENT & TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY DOCKET NO. 153190	APPLICATION NO. New U.S. Patent Application
	FIRST NAMED INVENTOR Hideo SANAI	
	FILING DATE January 24, 2014	

U.S. PATENT DOCUMENTS				
Examiner Initials	Cite No.	Document Number	Date	Name
	1	2010/0137751 A1	06/03/2010	Tadami
	2	2003/0040672 A1	02/27/2003	Ogura et al.
	3	2010/0324458 A1	12/23/2010	Okada et al.
	4	2006/0265035 A1	11/23/2006	Yachi et al.
	5	6,666,860 B1	12/23/2003	Takahashi

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Document Number	Date	Country	With English Abstract	With English Translation
	6	WO 98/14131 A1	04/09/1998	WIPO		
	7	JP-A-2006-341066	12/21/2006	JAPAN	X	X
	8	JP-A-2006-187668	07/20/2006	JAPAN	X	X
	9	JP-A-2001-501513	02/06/2001	JAPAN		X
	10	JP-A-2001-112768	04/24/2001	JAPAN	X	X

OTHER DOCUMENTS		
Examiner Initials	Cite No.	Including name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	11	International Search Report issued in International Application No. PCT/JP2013/060447 dated May 7, 2013 (with translation).

EXAMINER	DATE CONSIDERED
Examiner: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Date: January 24, 2014

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : A61B 18/14, A61M 1/00 — A1

(11) International Publication Number: WO 98/14131

(43) International Publication Date: 9 April 1998 (09.04.98)

(21) International Application Number: PCT/US96/15796

(22) International Filing Date: 2 October 1996 (02.10.96)

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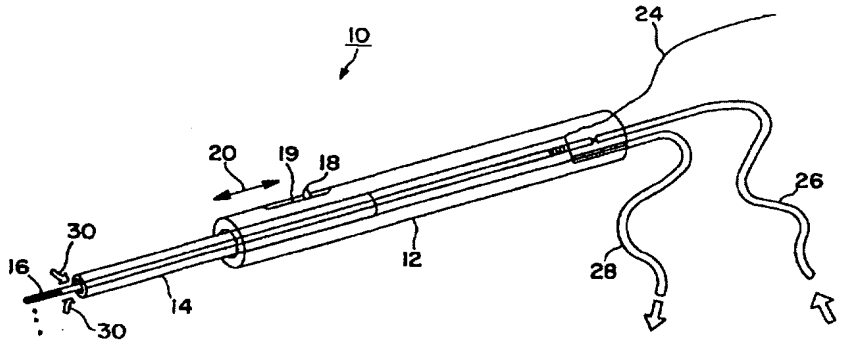
(72) Inventors: MULIER, Peter, M., J.; 1408 Forest Lane, St. Paul, MN 55112 (US). HOEY, Michael, F.; 5377 Pond Drive, Shorview, MN 55126 (US).

(74) Agents: KINGHORN, Curtis, D. et al.; Medtronic, Inc., 7000 Central Avenue Northeast, MS301, Minneapolis, MN 55432 (US).

(81) Designated States: AU, CA, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: FLUID–ASSISTED ELECTROCAUTERY DEVICE



(57) Abstract

An electrocautery instrument (10) is provided with a source of conductive fluid coupled to a proximal end of a hollow electrode (16). Conductive fluid is communicated through said electrode (16) and expelled out of the distal end thereof during electrocautery, forming a "virtual electrode". The infused conductive liquid conduits the RF electrocautery energy away from the conductive electrode (16), thereby displacing the region of thermal generation and reducing the extent of burns and perforations caused by conventional electrocautery electrodes. In one embodiment, the electrode (16) is partially disposed within and extends distally out of a retractable suction tube (14), such that smoke and fluid are aspirated from the electrocautery site. When the suction tube (14) is fully advanced, the electrode (16) is concealed therein, enabling suction without electrocautery to be performed.

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FLUID-ASSISTED ELECTROCAUTERY DEVICE

FIELD OF THE INVENTION

This invention relates generally to the field of medical instruments, and more particularly relates to an electrocautery device.

BACKGROUND OF THE INVENTION

Various types of electrocautery devices for incising and cauterizing body tissue are known and used in the medical field. Typically, such devices include a conductive blade or needle which serves as one electrode in an electrical circuit which is completed via a grounding electrode coupled to the patient. Incision of tissue is accomplished by applying a source of electrical energy (most commonly, a radio-frequency generator) to the blade. Upon application of the blade to the tissue, a voltage gradient is created, thereby inducing current flow and related heat generation at the point of contact. With sufficiently high levels of electrical energy, the heat generated is sufficient to cut the tissue and, advantageously to simultaneously cauterize severed blood vessels.

It is widely recognized in the prior art that the often substantial amount of smoke produced by electrocauterization of tissue is at least unpleasant, and in some cases distracting or even hazardous to the operator and other attending medical personnel. As a result, it has been proposed, and is common, to provide an electrocautery device with smoke-aspirating capabilities, such that the smoke produced from electrocauterization is quickly withdrawn from the area of incision. Smoke aspiration may be accomplished by providing, in the handle of the electrocautery device near the electrocautery blade/electrode, an inlet port to be coupled to a vacuum or suction source. Examples of this are described in U.S. Patent No. 4,307,720 to Weber, Jr., entitled "Electrocautery

Apparatus and Method and Means for Cleaning the Same;" in U.S. Patent No. 5,242,442 to Hirschfeld, entitled "Smoke Aspirating Electrosurgical Device;" and in U.S. Patent No. 5.269,781 to Hewell, entitled "Suction Assisted Electrocautery Unit."

It has also been recognized in the prior art that the accumulation of coagulated blood, tissue rubble, and other debris on the electrode/blade of an electrocautery device can present a problem for the operator, necessitating the periodic cleaning of the blade, e.g., by wiping the blade over sterilized gauze or the like. This is generally regarded as undesirable, since the need to clean the electrode/blade tends to interrupt the incision procedure and increases the risks associated with contamination of the blade or the incision, damage to the blade, injury to the operator, and the like. To address this problem, it has been proposed in the prior art to provide an electrocautery instrument in which the electrode/blade is in slidable engagement with the instrument's handle, such that when the blade is retracted into the hand, any adhering debris automatically scraped off onto the tip of the handle. Such an instrument is proposed in the above-referenced Weber, Jr. '720 patent. While this arrangement may have some benefit, it still may be necessary to wipe off the tip of the handle once the blade is retracted. It is believed that a more direct and effective approach to the problem would be to reduce the amount of debris created during the electrocautery process, thereby eliminating or at least reducing the need to clean the electrode/blade.

SUMMARY OF THE INVENTION

In view of the foregoing considerations, the present invention is directed to an improved electrocautery instrument.

In one embodiment of the invention, an electrocautery instrument is configured with an electrode/blade disposed within a retractable suction tube, such that with the suction tube advanced, the electrode/blade is concealed within the tube, and with the suction tube retracted, the distal end of the electrode/blade is exposed for performing electrocautery.

In accordance with one aspect of the invention, the electrocautery electrode/blade is implemented with a hollow, conductive tube, flattened at it distal end into a blade-like configuration. Conductive fluid is applied to the proximal end of the hollow electrode/blade, and expelled from the distal (blade) end thereof during electrocautery. In accordance with another aspect of the invention, the conductive fluid emanating from the electrode/blade conducts the RF electrocautery energy away from the blade, so that it is primarily the fluid, rather than the metal blade, which actually accomplishes the cutting of tissue. That is, the fluid serves as a "virtual" electrocautery electrode. Since it is the fluid, rather than the blade, which incises and cauterizes, no burns or perforations are made to the tissue, reducing the amount of debris in the incision. Also, the flow of fluid through the electrode/blade tends to keep the blade clean and cool.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other aspects of the present invention may perhaps be best appreciated with reference to a detailed description of a specific embodiment of the invention, when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a perspective view of an electrocautery instrument in accordance with one embodiment of the invention; and

Figure 2 is a enlarged perspective view of the distal end of the electrode/blade of the electrocautery instrument of Figure 1.

DETAILED DESCRIPTION OF A SPECIFIC EMBODIMENT OF THE INVENTION

Referring to Figure 1, there is shown a perspective view of a fluid-assisted electrocautery instrument 10 in accordance with one embodiment of the invention. Electrocautery instrument 10 comprises a handle 12, a suction tube 14, and an electrocautery electrode/blade 16. Handle 12 is preferably made of a sterilizable, rigid, and non-conductive material, such as nylon or the like. Suction tube 14, which is also preferably made of a sterilizable and non-conductive material, is slidably disposed partially within an internal lumen of handle 12, and projects distally out of the end thereof. Electrode/blade 16 is disposed within suction tube 14 and handle 12. Suction tube 18 is adapted to slide proximally and distally with respect to handle 12 and electrode 16 (i.e., in the directions of arrow 20 in Figure 1) by means of a sliding lever 18 extending out of a slot 19 in handle 12. With suction tube 14 in a retracted position, as shown in Figure 1, a distal portion of electrode/blade 16 projects beyond the distal end of tube 14, such that electrocautery can be performed. With suction tube in an advanced position, suction tube 14 completely conceals the tip of electrode/blade 16.

In accordance with one aspect of the invention, electrode/blade 16 is preferably implemented using a hollow cylindrical tube which has been flatted at its distal end, as shown in the greatly enlarged perspective view of Figure 2. In addition to being flattened, a portion of the distal end of electrode/blade 16 is removed to form a longitudinal slit 22 therein.

Three connections are made to electrocautery instrument 10: One terminal (e.g., positive) of a radio-frequency (RF) generator (not shown in Figure 1) is electrically coupled to electrode/blade 16 via a wire 24; a source of fluid to be expelled from slit 22 in electrode/blade 16 is coupled to the proximal end of electrode/blade 16 via a flexible tube or hose 26; and a suction hose 28 is coupled to handle 12 so as to be in communication with the internal lumen of handle 12 and with suction tube 14. When suction is applied via hose 28, air and fluid are drawn into the distal end of suction tube 14, as indicated by arrows 30. The ability to advance or retract suction tube 14 with respect to electrode/blade 16 enables the operator of the instrument to perform electrocautery while simultaneously aspirating smoke and fluid from the incision site, or to use suction tube 14 alone, without performing electrocautery.

As noted above, conductive fluid is communicated from inflow tube 26 and communicated along the length of electrode/blade 16 to be expelled from the distal end thereof. This is done in order to establish a so-called virtual electrode for performing electrocautery. The infusion of conductive fluid simultaneously with the application of RF energy is discussed in further detail in: U.S. patent application serial number 08/113,441 entitled "Method and Apparatus for R-F Ablation," filed on August 27, 1993 in the name of Peter M.J. Mulier and Michael F. Hoey, in U.S. patent application serial number 08/303,246, entitled "Method and Apparatus for RF Ablation," filed on September 8, 1994 in the name of Peter M.J. Mulier; and in U.S. patent application S.N. 08/302,304 entitled "Method and Apparatus for RF Ablation," filed in the name of Peter M.J. Mulier and Michael F. Hoey on September 8, 1994. The foregoing '441 '246, and '304 applications (hereinafter collectively referred to as "the RF ablation

applications") are each commonly assigned to the assignee of the present invention, and incorporated by reference herein in their respective entireties.

As described in the RF ablation patents, the infusion of conducting fluid into the area of application of RF energy creates a "virtual electrode," the size and shape of which can be controllably modified, and which can be rendered more or less conductive, thereby modifying the spread of RF energy. By varying such factors as the RF energy and duration, the rate of infusion of conductive liquid, and the conductivity of the infused solution, the size, shape, and intensity of the "virtual electrode" -- i.e., the intensity of thermal production in the area, can be controlled. In the case of the electrocautery device in accordance with the present invention, application of the conductive solution during the application of RF energy further assists by preventing overheating of the electrode/blade, extending the point at which burning or charring of tissue would otherwise normally occur. To enhance this effect, it is contemplated that the solution being infused may first be cooled.

Conductive solutions believed to be suitable for establishing the virtual electrode include saline, saturated saline, and Ringer's solution, among others. Regarding the source of conductive fluid, it is contemplated that a conventional pump may be coupled to input line 26. Alternatively, it is contemplated that a small, pre-pressurized canister of conductive solution may be used, such that no pump is required. In one embodiment, handle 12 may be configured to receive such a pressurized canister therein, eliminating the need for input line 26.

Although in the embodiment of Figure 1, input line 26, suction line 28, and electrical connection 24 are depicted separately, it is contemplated that these connections

to instrument 10 may be consolidated into a single line having two separate fluid-conducting lumens therein (one for input of conductive solution, one for suction), alongside an insulated electrical conductor.

Various alternate configurations of electrode/blade 16 are also contemplated. In one embodiment, a porous metal element is substituted for the flattened tube configuration of Figures 1 and 2.

From the foregoing detailed description of a specific embodiment of the invention, it should be apparent that a method and apparatus for performing fluid-assisted electrocautery of body tissue has been disclosed, wherein fluid delivered out of a hollow electrocautery electrode/blade creates a virtual electrode which incises and cauterizes the tissue.

Although a specific embodiment of the invention has been described herein, this has been done solely for the purposes of illustrating various aspects of the invention, and is not intended to be limiting with respect to the scope of the invention. It is contemplated that various substitutions, alterations, and/or modifications, including but not limited to those specifically discussed herein, may be made to the disclosed embodiment without departing from the spirit and scope of the invention as defined in the appended claims, which follow.

WHAT IS CLAIMED IS:

1. A fluid-assisted electrocautery instrument, comprising:

an elongate handle having proximal and distal ends and having a longitudinal lumen extending between said proximal and distal ends;

a suction tube, disposed partially within said lumen of said handle and having a distal end extending out of said distal end of said handle;

a conductive electrocautery electrode adapted to be coupled to a source of radio-frequency energy, said electrode comprising an elongate tube defining an internal lumen extending between proximal and distal ends of said electrode, said electrode disposed within said suction tube such that a distal end of said electrode extends distally beyond said distal end of suction tube;

a fluid input tube, coupled to said proximal end of said electrode and in fluid communication with said internal lumen of said electrode, such that conductive fluid supplied from said input tube is communicated along said electrode and expelled from said distal end of said electrode.

2. An electrocautery instrument in accordance with claim 1, wherein said distal end of said electrode is flattened into a blade-like configuration.

3. An electrocautery instrument in accordance with claim 1, further comprising: a suction hose, adapted to be coupled between said proximal end of said suction tube and a suction pump, for aspirating smoke and fluid during electrocautery.

4. An electrocautery instrument in accordance with claim 1, wherein said suction tube is slidably disposed in said handle such that said suction tube is

slidable between a fully retracted position wherein a distal end of said electrode extends beyond said distal end of said suction tube, and a fully advanced position wherein said distal end of said electrode is disposed within said suction tube.

5. A method of performing electrocautery, comprising the steps of:

(a) applying radio-frequency energy to an electrocautery site via a hollow, conductive electrode;

(b) simultaneously with step (a), infusing said electrocautery site with a conductive liquid expelled from said electrode.

6. A method in accordance with claim 5, further comprising the step of aspirating smoke and fluid the electrocautery site with a suction tube partially surrounding said electrode.

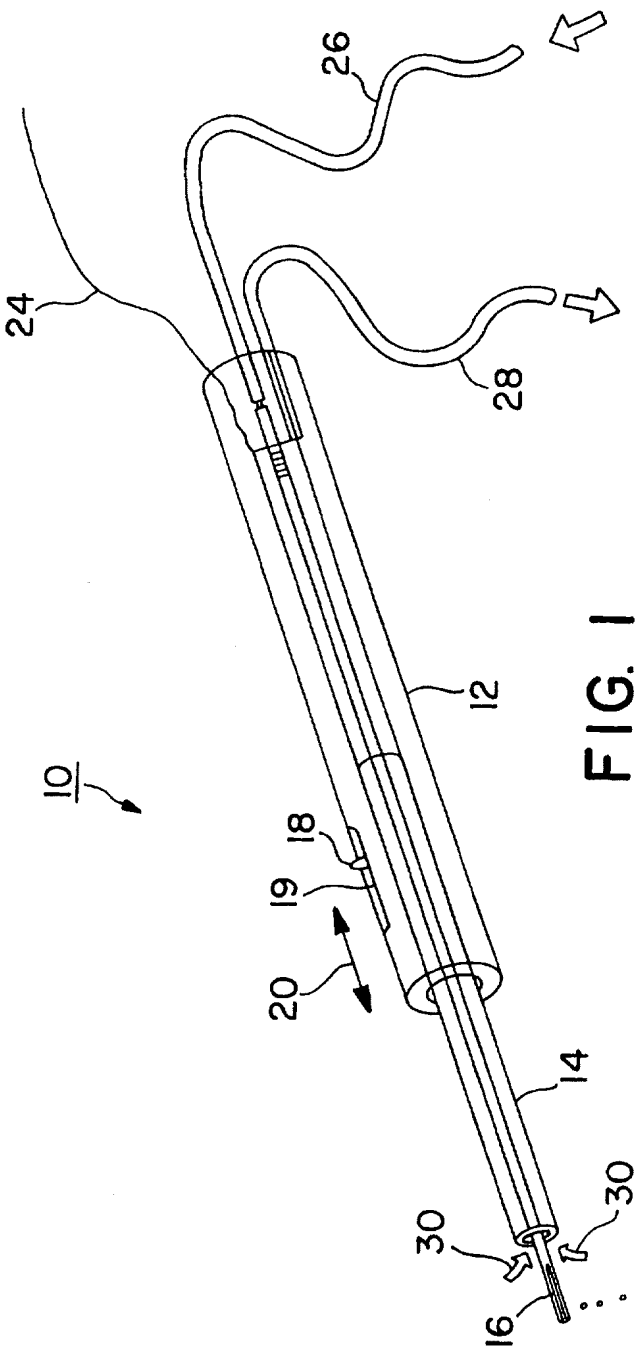

FIG. 1

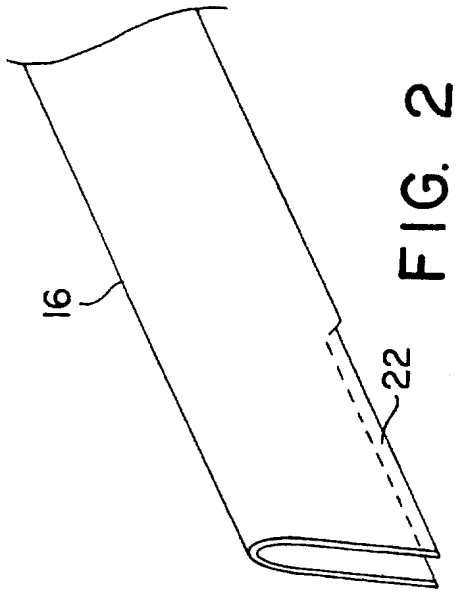

FIG. 2

INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/US 96/15796

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61B18/14 A61M1/00

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 6 A61B A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 326 529 A (DOSS JAMES D ET AL) 27 April 1982 see abstract; figures 1-5 see column 3, line 13 - column 4, line 10 ---	1-4
Y	US 5 472 441 A (EDWARDS STUART D ET AL) 5 December 1995 see abstract; figure 1 see column 7, line 1 - line 55 ---	1-4
A	US 1 735 271 A (SUTTEN H. GROFF) 12 November 1929 see page 1, line 44 - page 2, line 10; figure 1 --- -/--	2

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* 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 document but published on or after the international filing date

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"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

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1

Date of the actual completion of the international search	Date of mailing of the international search report
2 June 1997	12.06.97

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016	Zeinstra, H

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INTERNATIONAL SEARCH REPORT

Inte: nal Application No
PCT/US 96/15796

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 90 03152 A (CONSIDINE JOHN ;COLIN JOHN BUNCE (GB)) 5 April 1990 see abstract; figures 6-9 see page 9, line 14 - page 12, line 8	1,3,4
A	US 5 167 659 A (OHTOMO NAOKI ET AL) 1 December 1992 see abstract; figures 1-3 see column 1, line 63 - column 2, line 37 see column 3, line 11 - line 68	1
A	US 5 401 272 A (PERKINS RODNEY C) 28 March 1995 see abstract; figure 1A see column 2, line 59 - column 3, line 35	1

1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 96/ 15796

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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. [X] Claims Nos.: 5,6
because they relate to subject matter not required to be searched by this Authority, namely:
PCT Rule 39.1 (iv)

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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest.

[ ] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. onal Application No
PCT/US 96/15796

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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PATENT ABSTRACTS OF JAPAN

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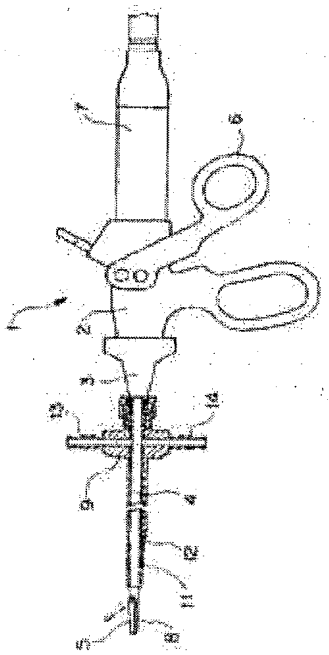
(54) MEDICAL TREATMENT INSTRUMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a medical treatment instrument capable of effectively sucking smoke or mist produced during treatment and quickly cooling the heated treatment portion after the treatment, thereby enhancing handleability.
SOLUTION: This medical treatment instrument includes: an elongated insertion portion 4 inserted into a body cavity; a clamping portion 5 and a probe 8 provided at the distal end of the insertion portion 4 for treating a treated tissue in the body cavity by heating; a sheath 9 into which at least a part of the insertion portion 4 is inserted; a flow passage 12 formed between the outer circumference of the insertion portion 4 and the inner circumference of the sheath 9 and through which either of a fluid supplied to the clamping portion 5 and the probe 8 and the fluid sucked from the inside of the body cavity flows; a water and air sending port 13 and a suction port 14 communicating with the flow passage 12; and an opening communicating with the flow passage 12 and opened opposite to the clamping portion 5 and the probe 8.



CLAIMS

[Claim(s)]
[Claim 1]
An insert portion of thin length inserted into the abdominal cavity,
A treatment part which is provided at a tip of the aforementioned insert portion and takes a measure by heating an organization for treatment in the aforementioned abdominal cavity,
A cylindrical member in which at least one copy of the aforementioned insert portion is inserted,
A flow path through which at least 1 side of a fluid which is formed between a periphery of the aforementioned insert portion and inner circumference of the aforementioned cylindrical member, and is supplied to the aforementioned treatment part, and a fluid sucked out of the aforementioned abdominal cavity flows,
An outflow entrance which performs at least 1 side of supply to the aforementioned flow path of a fluid which communicates the aforementioned flow path and is supplied to the aforementioned treatment part, and discharge from the aforementioned flow path of a fluid sucked out of the aforementioned abdominal cavity,
An opening by which communicated the aforementioned flow path, and the opening was opposed and carried out to the aforementioned treatment part,
A providing medical treatment device.
[Claim 2]
The medical treatment device according to claim 1 while the aforementioned cylindrical member is formed in large diameter rather than a path of the aforementioned insert portion in which a path of an inner peripheral surface of this cylindrical member was inserted, wherein the aforementioned treatment part provided at a tip of the aforementioned insert portion is projected from the aforementioned cylindrical member.
[Claim 3]
The medical treatment device according to claim 1 with which a cross-sectional area of the aforementioned opening is characterized by being smaller than a cross-sectional area of the aforementioned flow path.
[Claim 4]
The aforementioned treatment part consists of a freely openable/closable opening/closing part to a heating part which heats the aforementioned organization for treatment, and this heating part,
The medical treatment device according to claim 1 or 3 currently opposing and carrying out the opening of the aforementioned opening to the aforementioned heating part at least.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
The treatment part which the present invention heats the organization for treatment in the abdominal cavity, and deals with this organization for treatment is related with the medical treatment device provided by the insert portion of thin length.
[Background of the Invention]
[0002]
Conventionally, the ultrasonic treatment tool which is a medical treatment device from which organization excision, an organic matter, and other sediments are removed is variously proposed using supersonic vibration.
For example, a Patent document 1 has disclosed the ultrasonic treatment tool which can suck particles (aerosol is called hereafter), such as blood in the abdominal cavity generated to this ultrasonic treatment in the case, while taking the ultrasonic measures of the organization for treatment using supersonic vibration.
[0003]
Specifically the ultrasonic treatment tool disclosed in the Patent document 1, The ultrasonic transducer (a vibrator is only called hereafter) is provided by the handpiece, and it has the composition connected with the probe for ultrasonic transmission of thin length (a probe is only called hereafter) with which the treatment part to which this vibrator takes the ultrasonic measures of the organization for treatment was provided. From this, the supersonic vibration which the vibrator emitted by drive is transmited to a treatment part via a probe.
[0004]
In the position (the tip side is called hereafter) which opposes to the treatment position of a probe at an ultrasonic treatment tool, the wrap sheath is provided by periphery shape so that annular open space may be formed between the peripheries by the side of this end of the probe.
[0005]
Open space and a suction opening which communicates are formed in a sheath.
Suction sources are connected to this suction opening via a suction tube.
The pipeline connected to the water supplying source which sprays water on an ultrasonic treatment tool to a treatment part, and which carries out an opening to the tip side is arranged.
[0006]
The ultrasonic treatment tool which was constituted in this way and which was disclosed in the Patent document 1 takes the ultrasonic measures of the organization for treatment by spraying water on a probe using the aerosol or mist generated by the cavitation while transmiting supersonic vibration to a treatment part. The aerosol generated during treatment can be sucked now by suction sources via the opening, suction opening, and suction tube which were formed in the sheath.
[Patent document 1] EP,0645987,B gazette
[Description of the Invention]
[Problem to be solved by the invention]
[0007]
By the way, the vibrator which faced performing ultrasonic treatment using the ultrasonic treatment tool, and was provided by the handpiece generates heat for the drive which emits supersonic vibration. In order to prevent that the handpiece is heated by this generation of heat, and it becomes impossible to hold, the ultrasonic treatment tool disclosed in the Patent document 1 has composition which cools a vibrator by supplying water to a vibrator in the case of ultrasonic treatment.
[0008]
However, in the ultrasonic treatment tool currently used, in order to perform treatment of coagulation or incision using the frictional heat of a probe and the organization for treatment, there is a problem that cooling by the water under treatment disclosed in the Patent document 1 makes treatment capability be deteriorated, and is not preferable in recent years. The circumstances where what has the composition which becomes unnecessary is becoming in use also have supply of water in cooling of the vibrator under drive.
[0009]
Even if it is an ultrasonic treatment tool which does not need supply of water for cooling of the vibrator under such a drive, a cavitation etc. occur during treatment with the moisture which the organization for treatment originally has. Also in the treatment using the laser treatment implement etc. which take a measure by the high frequency treatment tool which takes a measure with Joule heat not only using an ultrasonic treatment tool but using the high frequency current, or a laser beam, smoke and mist occur by treatment.
[0010]
As for the treatment using various treatment implements, it is common to also insert an endoscope into the abdominal cavity in order to observe the treatment part in the abdominal cavity with a treatment implement, but the mist and smoke which were generated during treatment will become very troublesome for an operator in order to soil the lens of the front face of an endoscope, while barring the field of view of an endoscope.
[0011]
For this reason, in the case of treatment, even if it is a treatment implement which is not made to generate a cavitation

intentionally, it is necessary to constitute so that the smoke generated during treatment, mist, etc. can be sucked by suction sources via the opening formed in the sheath, and a suction tube.
[0012]
In the treatment implement which deals with the organization for treatment using heat, the treatment part serves as an elevated temperature immediately after treatment. Therefore, when carrying out extraction of the treatment implement out of the abdominal cavity, it is common to carry out, after cooling a high temperature treatment part.
[0013]
However, since extraction was performed after usually waiting for a treatment part to cool automatically, it could not work promptly, and also this had the problem that it was very complicated for an operator. In the ultrasonic treatment tool with which this was disclosed in the Patent document 1, consideration is not made at all.
[0014]
While being able to suck effectively the smoke and mist which are generated during treatment in the medical treatment device which the object of this invention is made in light of the above-mentioned circumstances, heats the organization for treatment in the abdominal cavity, and deals with this organization for treatment, It is in providing the medical treatment device which improved usability by having the composition which can cool the heated treatment part promptly after treatment.
[Means for solving problem]
[0015]
To achieve the above objects, a medical treatment device by the present invention is provided with the following.
An insert portion of thin length inserted into the abdominal cavity.
A treatment part which is provided at a tip of the aforementioned insert portion and takes a measure by heating an organization for treatment in the aforementioned abdominal cavity.
The flow path through which at least 1 side of the fluid which is formed between the cylindrical member in which at least one copy of the aforementioned insert portion is inserted, and the periphery of the aforementioned insert portion and the inner circumference of the aforementioned cylindrical member, and is supplied to the aforementioned treatment part, and the fluid sucked out of the aforementioned abdominal cavity flows, An opening by which communicated the aforementioned flow path, communicated an outflow entrance which performs at least 1 side of supply to the aforementioned flow path of a fluid supplied to the aforementioned treatment part, and discharge from the aforementioned flow path of a fluid sucked out of the aforementioned abdominal cavity, and the aforementioned flow path, and the opening was opposed and carried out to the aforementioned treatment part.

[Effect of the Invention]
[0016]
While being able to suck effectively the smoke and mist which are generated during treatment in the medical treatment device which heats the organization for treatment in the abdominal cavity, and deals with this organization for treatment according to the present invention, The medical treatment device which improved usability can be provided by having the composition which can cool the heated treatment part promptly after treatment.
[0017]
If a measure is taken in the organization for treatment with an ultrasonic treatment tool, a high frequency treatment tool, a laser treatment implement, etc., mist and smoke will occur from the organization for treatment. Although such mist and smoke will be the cause which bars a view in the treatment which used the endoscope and the lens of the front face of an endoscope will be soiled further, according to the present invention, an observation visual field into the trap is reliably securable by sucking the mist generated during treatment, smoke, etc.
[0018]
In the treatment implement which deals with the organization for treatment using heat, the treatment part of the treating apparatus serves as an elevated temperature immediately after treatment. According to the present invention, since the dirt which adhered fluids, such as water and gas, to it at the treatment part while cooling the treatment part to the treatment part by returning water or carrying out a supplied air is removable immediately after treatment, the dirt of the treatment part after treatment can be prevented.
[Best Mode of Carrying Out the Invention]
[0019]
Hereafter, an embodiment of the invention is described with reference to Drawings.
Although there are a high frequency treatment tool using the Joule heat by the ultrasonic treatment tool and high frequency current using an ultrasonic wave, etc., a laser treatment implement using a laser beam, an RF treatment implement using electromagnetic waves, etc. in the medical treatment device which performs various treatment of a surgical operation etc. using heat, In this embodiment, the ultrasonic treatment tool for coagulotomy is mentioned as an example, and is described.
[0020]
(A 1st embodiment)
It is a figure showing the modification to which the figure and Fig.2 which Fig.1 made the section the ultrasonic treatment tool in which a 1st embodiment of the present invention is shown for a part of insert portion, and were shown provided the expanded sectional view by the side of the proximal end of the insert portion of Fig.1, and Fig.3 provided the grip slot on the periphery of the connection screw in Fig.2.The cross sectional view where the figure which Fig.4 expanded the tip side of the insert portion of Fig.1, and was shown, and Fig.5 are along the V-V line in Fig.4, and Fig.6 are the block diagrams showing the outline of the composition of the ultrasonic treatment device which has an ultrasonic treatment tool of Fig.1.
[0021]
In the following descriptions, an ultrasonic treatment tool describes the tip and operating part side for the side inserted into the abdominal cavity as a end face side.
As shown in Fig.1, the ultrasonic treatment tool 1 has the long and slender insert portion 4 inserted into the abdominal cavity, and is constituted, and the grip part 5 which is a treatment part is arranged at the tip side of the insert portion 4. The grip part 5 constitutes the opening/closing part which comprised a freely openable/closable pair of jaw, for example, grips and heats the organization for treatment in the abdominal cavity by this jaw, and deals with coagulotomy etc. The grip part 5 is freely openable/closable to the tip side of the probe 8 mentioned later.
[0022]

The end face side of the insert portion 4 is connected at the tip of the rotating knob 3 which is an operating part. It is connected at the tip of the stationary handle 2 which is an operating part, and the rotating knob 3 carries out rotatably operating of this insert portion 4 in the direction of the circumference of an axis by making the axial center of the insert portion 4 into a center of rotation.

[0023]

The movable handle 6 which carries out switching operation of the pair of jaw of the grip part 5 to the stationary handle 2 is attached via the supporting shaft, enabling free rotation. The probe 8 of the thin length by whom the tip was connected to the grip part 5 and the end face was connected to the vibrator 7 and who is a heating part inserted in the insert portion 4 is attached to the stationary handle 2.

[0024]

Since the probe 8 performs various treatment of coagulation etc. to the organization for treatment using the heat generated with the electric power supplied from the power supply body 27 (refer to Fig.6) mentioned later, the part connected to the grip part 5 which is a tip side of the probe 8 constitutes the treatment part.

[0025]

The periphery of the insert portion 4 and the periphery excluding the grip part 5 side of the insert portion 4 and the tip side of the probe 8 specifically are equipped with the returning-water suction sheath (a sheath is only called hereafter) 9 which is a cylindrical member. That is, the grip part 5 and tip side of the probe 8 is projected from the sheath 9. The sheath 9 is freely attachable/detachable to at least one copy of the periphery of the insert portion 4. That is, at least one copy of the insert portion 4 is inserted in the sheath 9.

[0026]

As shown in Fig.2, the sheath 9 has the body part 10 of flange shape, the insert portion [small diameter / body part / 10 / which extended from the approximately center of this body part 10 to the tip side] 11, and the connection part [small diameter / body part / 10 / which extended from the approximately center of the body part 10 to the end face side] 134, for example, and the principal part is constituted. The screw is formed in the periphery of the connection part 134.

[0027]

The inner diameter of the hole of the insert portion 11 is formed in large diameter from the outer diameter of the insert portion 4. Of this, the flow path 12 is formed between the inner circumference of the insert portion 11, and the periphery of the insert portion 4. The flow paths 10r and 10l. approximately perpendicular to the hole which communicates the body part 10 from a tip to a end face in this body part 10 are formed. The flow paths 10r and 10l. communicate the flow path 12.

[0028]

The returning-water supplied-air port 13 which is the input for connecting with returning water and the air supply device 29 (refer to Fig.6) which has a pump returning water mentioned later and for supplied airs in the body part 10 is provided so that it may become approximately perpendicular to the insert portion 11. The returning-water supplied-air port 13 has the flow path 13r, and this flow path 13r communicates with the flow path 10r of the body part 10. That is, in the flow path 12, the flow path 13r communicates.

[0029]

The suction port 14 which is a tap hole for connecting with the suction unit 30 (refer to Fig.6) which has a pump for suction mentioned later in the body part 10 is provided so that it may become approximately perpendicular to the insert portion 11. The suction port 14 has the flow path 14r, and this flow path 14r communicates with 10 l. of flow paths of the body part 10. That is, in the flow path 12, the flow path 14r communicates.

[0030]

If they are the ultrasonic treatment tool 1 and a range in which it does not interfere, the returning-water supplied-air port 13 and the suction port 14 are not restricted approximately perpendicularly to the insert portion 11, but will free the degree of setting angle and will be provided by the body part 10.

[0031]

The returning-water supplied-air port 13 and the suction port 14 constitute the outflow entrance which performs at least 1 side of supply to the flow path 12 of the fluid supplied to the treatment part which consists of the grip part 5 and tip side of the probe 8, and the discharge from the flow path 12 of the fluid sucked out of the abdominal cavity.

[0032]

The end of the tube 32 which connects the returning-water supplied-air port 13, and returning water and an air supply device 29 to the periphery of the returning-water supplied-air port 13 is covered. The end of the tube 32 which connects the suction port 14 and the suction unit 30 also to the periphery of the suction port 14 is covered.

[0033]

The key-like protruding part 15 which prevents the omission of the covered tube 32 is provided by the periphery of the returning-water supplied-air port 13 and the suction port 14. By this, direct continuation of the end of the tube 32 can be carried out to each port 13 and 14.

[0034]

The RUAROKKU cap 16 for connecting with the RUAROKKU connector which is not illustrated connected to each end of the tube 32 is provided by the end of the periphery of the returning-water supplied-air port 13 and the suction port 14, respectively. By this, a RUAROKKU connector can connect to each port 13 and 14 the tube 32 connected to the end.

[0035]

Only either of the protruding part 15 and the RUAROKKU cap 16 may be provided in each port 13 and 14. The number of connections provided by the body part 10 is not limited to two, but if it is one or more, it can provide any number. When providing one, it describes in detail by the Fig.18 mentioned later - Fig.22.

[0036]

The annular connection screw 17 is screwed in the screw part formed in the periphery of the connection part 134 of the body part 10. In the axial direction (the direction of an insertion shaft is called below) of an insert portion, the connection screw 17 is attached to the periphery of the connection part 134 so that the elastic member 18 and the sleeve 19 may be put between the proximal end 21 of the connection screw 17, and the bottom part 34 of the connection part 134.

[0037]

The elastic member 18 and the sleeve 19 are formed annularly, and each inner circumference of the elastic member 18 and the sleeve 19 is largely formed rather than the outer diameter of the insert portion 4 so that the insert portion 4 may be inserted in.

[0038]
The inner circumference of the opening formed in the proximal end 21 of the connection screw 17 is also largely formed rather than the outer diameter of the insert portion 4 so that the insert portion 4 may be inserted in. The inner circumference of the opening formed in the proximal end 21 is formed smaller than the path by the side of the tip of the rotating knob 3.
[0039]
The grip slot 20 may be formed so that it may be easy to attach to the connection part 134, as shown to the periphery of the connection screw 17 in Fig.3.
[0040]
In order to attach to the connection part 134 of the body part 10 the connection screw 17, the elastic member 18, and the sleeve 19 which were constituted in this way, first, the end face side of the elastic member 18 is inserted in the tip side of the sleeve 19, and the proximal end of this elastic member 18 is dashed against the flange 22 formed in the end face of the sleeve 19.
[0041]
Subsequently, where the elastic member 18 and the sleeve 19 are combined, carry out fitting of the tip side of the elastic member 18 to the inner circumference of the connection part 134 of the body part 10, and at the end in the proximal end 21 of the connection screw 17, The connection screw 17 is made to screw in the periphery of the connection part 134 so that the elastic member 18 and the sleeve 19 may be crushed in the direction of an insertion shaft.
[0042]
In this case, the length which combined the elastic member 18 and the sleeve 19 is shorter than what added the length of the hole of the proximal end of the connection part 134, and the length of the hole of the connection screw 17.
[0043]
As shown in Fig.4, the tip of the sheath 9 when the insert portion 4 is equipped with the sheath 9 is placed at the end face side rather than the grip part 5 so that the grip part 5 and tip side of the probe 8 may be exposed. The tip of the insert portion 11 of the sheath 9 is formed in tapered shape.
[0044]
As shown in Fig.5, for example, it abuts the inner circumference of the point of the insert portion 11 with the periphery of the insert portion 4, the four circular arcs 25 which the four convex supporting parts 24 are formed, and connect the four supporting parts 24 with the inner circumference of the point of the insert portion 11 in accordance with the inner circumference of the point of the insert portion 11 are formed.
[0045]
The tip flow path 26 is formed between the four circular arcs 25 divided with the four supporting parts 24, and the periphery of the insert portion 4, and this tip flow path 26 communicates with the flow path 12 formed between the inner circumference of the insert portion 11, and the periphery of the insert portion 4.
[0046]
When the tip of the sheath 9 when it equips with the sheath 9 is placed at the end face side rather than the grip part 5, the opening of the tip flow path 26 is carried out to the insert portion 4 as the opening 35 at the end face side of the grip part 5 which it is near the position which opposes to the grip part 5 or the probe 8. The opening 35 is provided from the grip part 5 by the near position by the side of the tip of the probe 8. That is, the opening of the opening 35 is carried out to the tip side of the probe 8 at least.
[0047]
As shown in Fig.6, the ultrasonic treatment device 100 has the ultrasonic treatment tool 1, the power supply body 27, the switch 28, returning water and the air supply device 29 that are supply sources, and the suction unit 30 which is suction sources, and the principal part is constituted.
[0048]
The vibrator 7 of the ultrasonic treatment tool 1 is connected with the power supply body 27 which performs an ultrasonic drive. The switch 28 for oscillating the vibrator 7 is connected to the power supply body 27.
[0049]
The power supply body 27, returning water and an air supply device 29, and the suction unit 30 are electrically connected by the cable 31 so that it can interlock and operate. Returning water and the air supply device 29 are connected by the returning-water supplied-air port 13 and the tube 32 of the ultrasonic treatment tool 1, and the suction unit 30 is connected by the suction port 14 and the tube 32 of the ultrasonic treatment tool 1.
[0050]
On the other hand, a fluid from returning water and the air supply device 29 here a supplied air and when water is returned, A fluid passes through the flow path 10r and the flow path 12 between the inner circumference of the insert portion 11 of the sheath 9, and the periphery of the insert portion 4, after advancing into the flow path 13r of the returning-water supplied-air port 13 via the tube 32 connected with returning water and the air supply device 29, From the tip opening 35 of the tip flow path 26, returning water and a supplied air are turned on the grip part 5 and tip side of the probe 8.
[0051]
On the other hand, when fluids, such as smoke and mist, are sucked by the suction unit 30, after advancing into the tip flow path 26 from the tip opening 35, a fluid passes through the flow paths 12, 10l., and 14r, and is discharged from the tip opening 35 from the suction unit 30 via the tube 32 connected to the suction port 14.
[0052]
Next, it describes using Fig.1 - Fig.6 and Fig.7 - Fig.9 about an operation of the ultrasonic treatment tool 1 of this embodiment constituted in this way.
The exploded view where Fig.7 freed itself from the insert portion 4 of the ultrasonic treatment tool 1 of Fig.1 to the sheath 9, and Fig.8,The flow chart and Fig.9 in which the control method of the ultrasonic treatment device at the time of dealing with the organization for treatment in the abdominal cavity was shown using the ultrasonic treatment tool of Fig.1 are a figure showing the state where the tip side of a grip part was moved for the tip side of the insert portion of the sheath of Fig.1 to the wrap position.
[0053]
First, after inserting the sheath 9 in the insert portion 4 of the ultrasonic treatment tool 1 until it runs against the rotating knob 3 from the proximal end side of the sheath 9 to the tip side of this insert portion 4 as shown in Fig.7, as shown in Fig.2.The connection screw 17 is made to screw in the periphery of the connection part 134 so that the elastic member 18 and the sleeve

19 may be crushed for the connection screw 17 in the direction of an insertion shaft in the proximal end 21 of this connection screw 17.
[0054]
As a result, the inner diameter of the elastic member 18 becomes small, and the inner circumference of the elastic member 18 is stuck with the periphery of the insert portion 4. The sheath 9 is fixed to the ultrasonic treatment tool 1 by this. In this case, as mentioned above, the flow path 12 is formed between the periphery of the insert portion 4, and the inner circumference of the insert portion 11 of the sheath 9. The flow path 12 communicates with the tip flow path 26, the flow paths 10r and 10l. of the body part 10, the flow path 13r of the returning-water supplied-air port 13, and the flow path 14r of the suction port 14.
[0055]
Then, the returning-water supplied-air port 13, and returning water and an air supply device 29 are connected by the tube 32, and further, after connecting the suction port 14 and the suction unit 30 by the tube 32, the insert portion 4 of the ultrasonic treatment tool 1 is inserted into the abdominal cavity, and it deals with the organization for treatment in the abdominal cavity.
[0056]
The following operations are performed by sending a control signal to returning water, the air supply device 29, and the suction unit 30 via the communication wire which is not illustrated from the control means 70 which is the control part arranged in the power supply body 27 of the ultrasonic treatment device 100. That is, it is performed by the motion control of the control means 70.
[0057]
When dealing with the organization for treatment in the abdominal cavity, after the organization for treatment which becomes a candidate for treatment is first gripped by the grip part 5, as shown in Fig.8. In Step S1, the vibrator 7 performs an ultrasonic drive in response to supply of the electric power from the power supply body 27 by carrying out ON operation of a supersonic vibration switch (SW) and the becoming switch 28 (refer to Fig.6). Vibration of the vibrator 7 is transmited to the grip part 5 via the probe 8. The organization for treatment is heated by this by friction with the organization for treatment by vibration of the probe 8 by the side of a tip, and treatment of coagulotomy etc. is performed.
[0058]
Subsequently, a fluid has it returning water or judged by the operation of returning water and the air supply device 29 from the opening 35 to the grip part 5 or the probe 8 in Step S2 whether the supplied air is carried out.
[0059]
On the other hand, a fluid from the opening 35 returning water or when the supplied air is carried out, After stopping returning water or the supplied air of the fluid from the opening 35 and checking again that the switch 28 is ON at Step S10 by branching to Step S3 and stopping returning water and the air supply device 29, it shifts to step S4. On the other hand, from the opening 35, a fluid shifts to step S4, returning water or when a supplied air is not carried out.
[0060]
In step S4, it will interlock, if heating treatment of the organization for treatment is carried out by the grip part 5, and when the suction unit 30 operates, suction of the mist and smoke which were generated on the occasion of treatment is performed. Specifically, after the fluid sucked by the suction unit 30 advances into the tip flow path 26 from the tip opening 35, it flows through the flow paths 12, 10l., and 14r, and is discharged from the tip opening 35 from the suction unit 30 via the tube 32 connected to the suction port 14.
[0061]
As shown in Fig.9, in this case the sheath 9, Since it is connected to the elastic member 18 and can slide to the insert portion 4, after making the insert portion 11 of the sheath 9 slide to the tip side and covering the grip part 5, a fluid may be sucked from the tip of the insert portion 4 by extruding the tip opening 35 from the grip part 5 to the tip side.
[0062]
After the treatment of the organization for treatment by the grip part 5 is completed, in Step S5, by carrying out the turn off operation of the switch 28 (refer to Fig.6), supply of the electric power from the power supply body 27 is intercepted, and the vibrator 7 stops.
[0063]
Subsequently, in conjunction with a stop of the vibrator 7, suction of the mist and smoke which were generated on the occasion of treatment is stopped by suspending the suction unit 30 at Step S6. Then, it shifts to Step S7.
[0064]
receiving the grip part 5 or the probe 8 by operating in Step S7, only while [several seconds] returning water and the air supply device 29 are the time set up beforehand -- the tip opening 35 to a fluid is returning water -- or a supplied air is carried out.
[0065]
Specifically the fluid supplied from returning water and the air supply device 29, After advancing into the flow path 13r of the returning-water supplied-air port 13 via the tube 32, it flows through the flow path 12 between the inner circumference of the insert portion 11 of the sheath 9, and the periphery of the insert portion 4, and returning water and a supplied air are made the grip part 5 or the probe 8 from the tip opening 35 of the tip flow path 26. The grip part 5 or the probe 8 heated by treatment is cooled by this. The dirt of the grip part 5 adhering by treatment is removable by returning water or the supplied air of a fluid.
[0066]
Subsequently, in Step S8, it is judged whether the fluid has passed while [several seconds] returning water or the time by which the supplied air was carried out was set up beforehand since the tip opening 35. A routine is ended, after returning to Step S2, suspending returning water and the air supply device 29 for the supplied air or returning-water time of a fluid after a lapse for several seconds in Step S3 and checking OFF of the switch 28 in the subsequent step S10, if while [several seconds] being set up beforehand had not passed.
[0067]
If it returned to Step S8, and the fluid has passed while [several seconds] returning water or the time by which the supplied air was carried out was set up beforehand since the tip opening 35, It shifts to step S9, and finally, by step S9, by stopping returning water and the air supply device 29, returning water or the supplied air of the fluid from the tip opening 35 is stopped, and a routine is completed after that.
[0068]
Thus, in the ultrasonic treatment tool 1 of this embodiment, while providing returning water or the flow paths 10r, 12, 13r, and 26 for carrying out a supplied air for the fluid to the ultrasonic treatment tool 1, the flow paths 10l., 12, 14r, and 26 which suck a

fluid from the inside of the abdominal cavity were provided at the time of treatment. That is, it indicated that the flow path 12 provided between the insert portion 4 and the insert portion 11 served as the flow path which sucks a fluid from the inside of the abdominal cavity while being returning water or a flow path for carrying out a supplied air about a fluid.
[0069]
The opening 35 of the flow paths 10r, 10l., 12, 13r, 14r, and 26 was provided to the tip side of the ultrasonic treatment tool 1 so that opposed and it might be placed near the grip part 5 and the probe 8.
[0070]
Treatment using a treatment implement can be performed reliably, always securing an operator's view by this, since the smoke and mist which are generated in the case of ultrasonic treatment were effectively sucked via the flow paths 10l., 12, 14r, and 26 with the suction unit 30.
[0071]
A fluid from the opening 35 via the flow paths 10r, 12, 13r, and 26 with returning water and the air supply device 29 to the grip part 5 and the probe 8 which became an elevated temperature with frictional heat immediately after ultrasonic treatment Since [returning water or since a supplied air can be carried out], The heated grip part 5 or the probe 8 can be promptly cooled after treatment.
[0072]
It becomes unnecessary to provide two flow paths with the flow path which sucks returning water or the flow path for carrying out a supplied air, and the fluid out of the abdominal cavity for a fluid to the insert portion 4.
[0073]
From the above thing, the ultrasonic treatment tool which improved usability can be provided for an operator.
[0074]
A modification is shown hereafter.
It was indicated that it was used by this embodiment in order that returning water or the fluid by which a supplied air is carried out may cool the grip part 5 and the probe 8 after treatment from the opening 35. Not only this but a fluid may be used for washing in the abdominal cavity a supplied air or by returning water into the abdominal cavity.
[0075]
According to this, after insertion of the returning-water siphon from another port of the ultrasonic treatment tool 1 is omissible and also carrying out extraction of the ultrasonic treatment tool out of the abdominal cavity, the time and effort which inserts only the returning-water siphon is omissible.
[0076]
(A 2nd embodiment)
The expanded sectional view by the side of the proximal end of the insert portion of Fig.10 and the Fig.12 of the figure and Fig.11 which a part of insert portion made the section the ultrasonic treatment tool for which Fig.10 shows a 2nd embodiment of the present invention, and were shown are the expanded sectional views by the side of the point of the insert portion of Fig.10.
[0077]
It differs in that the composition of the ultrasonic treatment tool of this embodiment provides to a rotating knob, without providing the returning-water supplied-air port 13 and the suction port 14 to the body part 10 of the sheath 9 as compared with the ultrasonic treatment tool 1 of a 1st embodiment shown in the above-mentioned Fig.1 - Fig.9.Therefore, only this point of difference is described, the same code is given to the same composition as a 1st embodiment, and that description is omitted.
[0078]
As shown in Fig.10, the ultrasonic treatment tool 201 has the long and slender insert portion 4 inserted into the abdominal cavity, and is constituted, and the grip part 5 which is a treatment part is arranged at the tip side of the insert portion 4. The side, at least one copy, for example, the end face, of the insert portion 4, is covered by the rotating knob 37 which is a cylindrical member of an operating part. As a result, the grip part 5 and tip side of the probe 8 is projected from the rotating knob 37. The rotating knob 37 carries out rotatably operating of this insert portion 4 in the direction of the circumference of an axis by making the axial center of the insert portion 4 into a center of rotation, and its function is as substantially identical as the rotating knob 3 of a first embodiment.
[0079]
Space 38 which is a flow path is formed between the periphery by the side of the end face of the insert portion 4, and the inner circumference of the rotating knob 37. That is, the end face side of the insert portion 4 is inserted in space 38 of the inner circumference of the rotating knob 37. The rotating knob 37 is connected at the tip of the stationary handle 2 of an operating part.
[0080]
The movable handle 6 which carries out switching operation of the pair of jaw of the grip part 5 to the stationary handle 2 is attached via the supporting shaft, enabling free rotation. The probe 8 of the thin length by whom the tip was connected to the grip part 5 and the end face was connected to the vibrator 7 inserted in the pipeline probe channel 46 in the insert portion 4 is attached to the stationary handle 2.
[0081]
As shown in Fig.11, are an inside of the insert portion 4 and between the inner circumference of the insert portion 4, and the periphery of the pipeline probe channel 46, For example, the driving shaft channel 40 which transmits operation of the movable handle 6 to the grip part 5 and in which the driving shaft 39 which connects the movable handle 6 and the grip part 5 is inserted is arranged. The driving shaft channel 40 also constitutes the flow path.
[0082]
As shown in Fig.12, in the position which opposes to the grip part 5, the opening of the tip side of the driving shaft channel 40 is carried out to the tip side of the insert portion 4 as the opening 41. The driving shaft channel 40 is inserted in with space 38 of the rotating knob 37. The opening 41 is provided from the grip part 5 by the near position by the side of the tip of the probe 8. That is, the opening of the opening 41 is carried out to the tip side of the probe 8 at least.
[0083]
The returning-water supplied-air port 13 is provided by the rotating knob 37. The returning-water supplied-air port 13 has the flow path 13r, and this flow path 13r communicates with space 38 of the rotating knob 37. That is, in the flow path 13r, the driving shaft channel 40 communicates. The returning-water supplied-air port 13 is connected with returning water and the air supply device 29 via the tube 32 like a 1st embodiment mentioned above.

[0084]
The suction port 14 is provided by the rotating knob 37. The suction port 14 has the flow path 14r, and this flow path 14r communicates with space 38 of the rotating knob 37. That is, in the flow path 14r, the driving shaft channel 40 communicates. The suction port 14 is connected with the suction unit 30 via the tube 32 like a 1st embodiment mentioned above.
[0085]
It provides so that the rubber lining 44 which an outer peripheral surface sticks to the middle position of the probe 8 in the insert portion 4 at the inner circumference of the pipeline probe channel 46 may cover the probe 8. The tip ring 68 and the rubber lining 69 are arranged also between the component arranged by the inner circumference of the stationary handle 2, and the probe 8 inserted in in the stationary handle 2.
[0086]
Since the composition of the ultrasonic treatment device with which the ultrasonic treatment tool 201 constituted in this way is arranged is the same as the composition of the ultrasonic treatment device of the 1st enforcement shown in Fig.6, the description is omitted.
[0087]
Next, it describes about an operation of the ultrasonic treatment tool 201 of this embodiment constituted in this way. Hereafter, since the control action of the ultrasonic treatment device 100 in the case of treatment is the same as the control action of a 1st embodiment shown in Fig.8, the description is omitted. Therefore, only the flow of the fluid in the flow path of the ultrasonic treatment tool 201 at the time of sucking a fluid for a fluid, returning water or when carrying out a supplied air is hereafter described as an operation of this embodiment.
[0088]
First, the returning-water supplied-air port 13, and returning water and an air supply device 29 are connected by the tube 32, and further, after connecting the suction port 14 and the suction unit 30 by the tube 32, the insert portion 4 of the ultrasonic treatment tool 201 is inserted into the abdominal cavity, and it deals with the organization for treatment in the abdominal cavity.
[0089]
Then, when, sucking fluids, such as mist generated in the case of treatment, on the other hand, After the fluid sucked by the suction unit 30 advances into the driving shaft channel 40, it flows through the flow paths 38 and 14r, and is discharged from the opening 41 from the suction unit 30 via the tube 32 connected to the suction port 14.
[0090]
Under the present circumstances, since the fluid which entered in the rotating knob 37 has the rubber lining 44 provided by the probe 8, it has composition which does not flow into the pipeline probe channel 46. Since the tip ring 68 and the rubber lining 69 are provided by the inner circumference of the stationary handle 2, the sucked fluid has composition not flowing.
[0091]
On the other hand, after the fluid supplied from returning water and the air supply device 29 advances into the flow path 13r of the returning-water supplied-air port 13 via the tube 32, it flows through space 38 and the driving shaft channel 40, and, as for returning water and a supplied air, is made into the grip part 5 and the probe 8 from the tip opening 41.
[0092]
Thus, in the ultrasonic treatment tool 201 in which this embodiment is shown, the returning-water supplied-air port 13 and the suction port 14 were provided to the rotating knob 37. The driving shaft channel 40 in which the driving shaft 39 arranged in the insert portion 4 is inserted was used as a flow path at the time of sucking the fluid at returning water or the time of carrying out a supplied air for a fluid. That is, it indicated that the driving shaft channel 40 served as the flow path which sucks a fluid from the inside of the abdominal cavity while being returning water or a flow path for carrying out a supplied air about a fluid.
[0093]
By this, since the flow path through which a fluid flows into the ultrasonic treatment tool 201 can be formed even if it does not use the sheath 9, compared with a 1st embodiment mentioned above, a manufacturing cost is reducible.
[0094]
When rotating the rotating knob 37, the returning-water supplied-air port 13 and the suction port 14 can be moved to the position which does not contact to rotation of a rotating knob.
[0095]
Other effects are the same as that of the ultrasonic treatment tool of a 1st embodiment mentioned above.
[0096]
(A 3rd embodiment)
The figure and Fig.14 which Fig.13 made the section the ultrasonic treatment tool in which a 3rd embodiment of the present invention is shown for a part of insert portion, and were shown,It is a cross sectional view where the cross sectional view which is along the XIV-XIV line in Fig.13, and Fig.15 are along the expanded sectional view by the side of the proximal end of the insert portion of Fig.13, Fig.16 is along the expanded sectional view by the side of the point of the insert portion of Fig.13, and Fig.17 is along the XVII-XVII line in Fig.16.
[0097]
The composition of the ultrasonic treatment tool of this embodiment extends a rotating knob to the tip side of an insertion shaft as compared with the ultrasonic treatment tool 1 of a 2nd embodiment shown in the above-mentioned Fig.10 - Fig.12, and the points which provided the returning-water supplied-air port 13 and the suction port 14 to the this extended part differ.Therefore, only this point of difference is described, the same code is given to the same composition as a 2nd embodiment, and that description is omitted.
[0098]
As shown in Fig.13, the ultrasonic treatment tool 301 has the long and slender insert portion 4 inserted into the abdominal cavity, and is constituted, and the grip part 5 which is a treatment part is arranged at the tip side of the insert portion 4. The side, at least one copy, for example, the end face, of the insert portion 4, is covered with the rotating knob 42 which is a cylindrical member of an operating part. That is, the grip part 5 and tip side of the probe 8 is projected from the rotating knob 42.
[0099]
in addition -- being extended in the direction of a tip of the insert portion 4 from the rotating knob 37 of a 2nd embodiment, although the rotating knob 42 carries out rotatably operating of this insert portion 4 in the direction of the circumference of an axis by making the axial center of the insert portion 4 into a center of rotation and its function is as substantially identical as the rotating knob 37 of a second embodiment -- formation -- now, it is. The rotating knob 42 is connected at the tip of the

stationary handle 2 of an operating part.
[0100]
The movable handle 6 which carries out switching operation of the pair of jaw of the grip part 5 to the stationary handle 2 is attached via the supporting shaft, enabling free rotation. The probe 8 of the thin length by whom the tip was connected to the grip part 5 and the end face was connected to the vibrator 7 inserted in the pipeline probe channel 46 in the insert portion 4 is attached to the stationary handle 2. Between the inner circumference of the pipeline probe channel 46, and the periphery of the probe 8, as shown in Fig.15, the flow path 312 is formed.
[0101]
An outer peripheral surface is the sectional shape stuck to the inner circumference of the pipeline probe channel 46, and the circular rubber lining 44 is provided by the position by the side of the end face of the probe 8 in the insert portion 4, for example.

[0102]
An outer peripheral surface is the sectional shape stuck to the inner circumference of the pipeline probe channel 46, and the rubber lining 45 of the elliptical form is provided by the position by the side of the tip of the probe 8 in the insert portion 4, for example.
[0103]
In detail, as shown in Fig.17, it is in the pipeline probe channel 46, and the rubber lining 45 to which the two contact parts 45t abut the periphery of the probe 8 with the inner circumference of the pipeline probe channel 46 is covered.
[0104]
The tip flow path 47 is formed between the rubber lining 45 and the inner circumference of the pipeline probe channel 46 into which the two contact parts 45t were divided. The tip flow path 47 communicates with the flow path 312, and as shown in Fig.16, in the position which opposes to the grip part 5, the opening is carried out to the tip side of the insert portion 4 as the opening 48. The opening 48 is provided from the grip part 5 by the near position by the side of the tip of the probe 8. That is, the opening of the opening 48 is carried out to the tip side of the probe 8 at least.
[0105]
The rubber lining 45 will not be limited to an elliptical form, if the tip flow path 47 is formed between this rubber lining 45 and the inner circumference of the pipeline probe channel 46.
[0106]
As shown in Fig.14, fitting of the returning-water supplied-air port 13 is carried out to the hole 43 provided by the insert portion 4, and it is provided by the part extended at the insertion shaft tip side of the rotating knob 42. In this case, the returning-water supplied-air port 13 is provided so that it may not interfere in the part extended at the insertion shaft tip side of the rotating knob 42 with the driving shaft channel 40 approximately perpendicularly [the insert portion 4].
[0107]
The returning-water supplied-air port 13 has the flow path 13r, and this flow path 13r communicates with the flow path 312. That is, in the tip flow path 47, the flow path 13r communicates. The returning-water supplied-air port 13 is connected with returning water and the air supply device 29 via the tube 32 like the 1st and 2 embodiment mentioned above.
[0108]
As shown in Fig.14, fitting of the suction port 14 is carried out to the hole 43 provided by the insert portion 4, and it is provided by the part extended at the insertion shaft tip side of the rotating knob 42. The suction port 14 is provided so that it may not interfere in the part extended at the insertion shaft tip side of the rotating knob 42 with the driving shaft channel 40 approximately perpendicularly [the insert portion 4].
[0109]
The suction port 14 has the flow path 14r, and this flow path 14r communicates with the flow path 312. That is, in the tip flow path 47, the flow path 14r communicates. The suction port 14 is connected with the suction unit 30 via the tube 32 like the 1st and 2 embodiment mentioned above.
[0110]
Since the composition of the ultrasonic treatment device with which the ultrasonic treatment tool 301 constituted in this way is arranged is the same as the composition of the ultrasonic treatment device of the 1st enforcement shown in Fig.6, the description is omitted.
[0111]
Next, it describes about an operation of the ultrasonic treatment tool 301 of the Moto embodiment constituted in this way. Hereafter, since the control action of the ultrasonic treatment device 100 in the case of treatment is the same as the control action of a 1st embodiment shown in Fig.8, the description is omitted. Therefore, only the flow of the fluid in the flow path of the ultrasonic treatment tool 301 at the time of sucking a fluid for a fluid, returning water or when carrying out a supplied air is hereafter described as an operation of this embodiment.
[0112]
First, the returning-water supplied-air port 13, and returning water and an air supply device 29 are connected by the tube 32, and further, after connecting the suction port 14 and the suction unit 30 by the tube 32, the insert portion 4 of the ultrasonic treatment tool 301 is inserted into the abdominal cavity, and it deals with the organization for treatment in the abdominal cavity.
[0113]
Then, when, sucking fluids, such as mist generated in the case of treatment, on the other hand, after the fluid sucked by the suction unit 30 advances into the tip flow path 47 from the opening 48, it flows through the flow paths 312 and 14r, and is discharged from the suction unit 30 via the tube 32 connected to the suction port 14.
[0114]
At this time, the fluid which entered in the pipeline probe channel 46 has composition which does not flow in the stationary handle 2 by the rubber lining 44.
[0115]
On the other hand, after the fluid supplied from returning water and the air supply device 29 advances into the flow path 13r of the returning-water supplied-air port 13 via the tube 32, it flows through the flow path 312 and the tip flow path 47, and, as for returning water and a supplied air, is made into the grip part 5 or the probe 8 from the opening 48.
[0116]
Thus, even if it constitutes the ultrasonic treatment tool 301 in which this embodiment is shown, the same effect as the

ultrasonic treatment tool 201 of a 2nd embodiment mentioned above can be acquired.
[0117]
A modification is shown hereafter.
Fig.18 is a fragmentary sectional view showing the modification which provided the slot in the position which opposes to Fig.1, Fig.10, and the grip part of the probe of the ultrasonic treatment tool of Fig.13.
[0118]
As shown in Fig.18, it is a point of the probe 8 connected to the grip part 5, and the five slots 49 may be formed in the back surface 8r of a connecting face, for example. Thus, by forming the five slots 49 in the back surface 8r of the probe 8 connected to the grip part 5, since it becomes largely by the surface area fang furrow 49 of the back surface 8r of the probe 8, the heat collected on the probe 8 radiates heat easily after treatment -- it is returning water to the probe 8 about a fluid -- or a supplied air is carried out and also the temperature of the probe 8 can be lowered.
[0119]
In this case, even if it is, returning water or the supplied air of a fluid to the probe 8 may be performed. The number of the slots 49 is not limited to five pieces, but the slot 49 may be learned except the surface which gears with the grip part 5, and shoes formation may be carried out. The form and the direction of the slot 49 can be set up arbitrarily.
[0120]
Another modification is shown hereafter.
The fragmentary sectional view and Fig.20 Fig.19 indicates the modification which provided one port which commonalized the returning-water supplied-air port and the suction port to be to the ultrasonic treatment tool of Fig.1,The block diagram showing the outline of the composition of the ultrasonic treatment device with which the expanded sectional view by the side of the proximal end of the insert portion of Fig.19 and Fig.21 have an ultrasonic treatment tool of Fig.19, and Fig.22 are the block diagrams showing the outline of another composition of the ultrasonic treatment device of Fig.21.
[0121]
The ultrasonic treatment tool 1 of a 1st embodiment mentioned above was shown that two ports, the returning-water supplied-air port 13 and the suction port 14, are provided by the body part 10. The port 323 which shared the returning-water supplied-air port 13 and the suction port 14 not only to this but to the body part 10 may be provided only one. That is, the port 323 constitutes input and a tap hole.
[0122]
Specifically, as shown in Fig.19, the common port 323 for connecting with returning water, the air supply device 29 (refer to Fig.21), and the suction unit 30 (refer to Fig.21) at the body part 10 is provided.As shown in Fig.20, the common port 323 has the flow path 323r, and this flow path 323r communicates with the flow path 10r (10l.) of the body part 10. That is, in the flow path 12, the flow path 323r communicates.
[0123]
The common port 323 constitutes the outflow entrance which performs at least 1 side of supply to the flow path 12 of the fluid supplied to the treatment part which consists of the grip part 5 and tip side of the probe 8, and the discharge from the flow path 12 of the fluid sucked out of the abdominal cavity.
[0124]
As shown in Fig.21, the common port 323, and returning water, the air supply device 29 and the suction unit 30 are connected by the tube 32 with which the switching valve 64 was provided by the middle position. Under the present circumstances, the end of the tube 32 is covered by the periphery of the common port 323. The switching valve 64 switches returning water of the fluid from returning water and the air supply device 29 or supplied-air operation, and the suctioning operation of the fluid by the suction unit 30 to one side.
[0125]
As the connection by the tube 32 of the common port 323, and returning water, the air supply device 29 and the suction unit 30 is shown in Fig.22, returning water and the air supply device 29, and the suction unit 30 may be independently connected to the common port 323. In this case, the ultrasonic treatment device 100 can consist of [rather than] easy mechanisms inexpensive using the switching valve 64.
[0126]
On the other hand, a fluid from returning water and the air supply device 29 here a supplied air and when water is returned, A fluid by the switching valve 64 via the tube 32 connected with returning water and the air supply device 29, After advancing into the flow path 323r of the common port 323, it passes through the flow paths 10r (10l.) and 12, and returning water and a supplied air are made the grip part 5 or the probe 8 from the tip opening 35 (refer to Fig.4) of the tip flow path 26 (refer to Fig.5).
[0127]
On the other hand, when a fluid is sucked by the suction unit 30 from the tip opening 35, By the switching valve 64, a fluid passes through the flow paths 12 and 10r (10l.), after advancing into the tip flow path 26 from the tip opening 35, and it is discharged from the suction unit 30 via the tube 32 connected to the common port 323.
[0128]
Thus, the same effect as a 1st embodiment mentioned above even if it provided the port for suction returning water or for supplied airs only one to the ultrasonic treatment tool can be acquired. Such composition may be applied to the ultrasonic treatment tool 201 of a 2nd embodiment mentioned above, and the ultrasonic treatment tool 301 of a 3rd embodiment.
[0129]
(A 4th embodiment)
The figure and Fig.24 which Fig.23 made the section the ultrasonic treatment tool in which a 4th embodiment of the present invention is shown for a part of insert portion, and were shown,The figure showing the state where the figure and Fig.25 in which the point side of the insert portion of Fig.23 was expanded and shown moved the slider member of Fig.24 at the tip of the direction of an insertion shaft, and Fig.26 are cross sectional views which are along the IIXVI-IIXVI line in Fig.25.
[0130]
The composition of the ultrasonic treatment tool of this embodiment is compared with the ultrasonic treatment tool 301 of a 3rd embodiment shown in the ultrasonic treatment tool 201 of a 2nd embodiment shown in the ultrasonic treatment tool 1 of a 1st embodiment shown in the above-mentioned Fig.1 - Fig.9, the above-mentioned Fig.10 - Fig.12, the above-mentioned Fig.13 - Fig.17,It faces cooling the grip part 5 and the probe 8, and differs in that a fluid is not used. Therefore, only this point of difference is described, the same code is given to the 1st - the same composition as a 3rd embodiment, and that description is

omitted.
[0131]
As shown in Fig.23, the ultrasonic treatment tool 401 has the long and slender insert portion 4 inserted into the abdominal cavity, and is constituted, and the grip part 5 which is a treatment part is arranged at the tip side of the insert portion 4. The end face side of the insert portion 4 is covered by the rotating knob 50 of the operating part.
[0132]
The rotating knob 50 carries out rotatably operating of this insert portion 4 in the direction of the circumference of an axis by making the axial center of the insert portion 4 into a center of rotation, and its function is as substantially identical as the rotating knob 3 of a first embodiment. The rotating knob 50 is connected at the tip of the stationary handle 2 of an operating part.
[0133]
The movable handle 6 which carries out switching operation of the pair of jaw of the grip part 5 to the stationary handle 2 is attached via the supporting shaft, enabling free rotation. The probe 8 of the thin length by whom the tip was connected to the grip part 5 and the end face was connected to the vibrator 7 is attached to the stationary handle 2.
[0134]
It is a end face side of the insert portion 4, and the wrap slider receptacle 51 is provided by the nearly tip of the rotating knob 50 in the insert portion 4, and, as for this slider receptacle 51, the proximal end is fixed between the inner circumference by the side of the tip of the rotating knob 50, and the periphery of the insert portion 4.
[0135]
The stopper 54 is covered at the tip of the slider receptacle 51, and C rings 52 and 53 are covered, respectively between the stopper 54 of the slider receptacle 51, and the proximal end of the slide receptacle 51.
[0136]
The slider member 55 is covered by the periphery of the insert portion 4 so that the slider receptacle 51 may be covered. The holding part 56 of flange shape is provided by the proximal end of the slider member 55, and as shown in Fig.24, the slider receptacle 51 and the protruding part 57 abutted slidably are formed in the inner circumference of this holding part 56.
[0137]
As shown in Fig.25 and Fig.26, of the slider member 55, it is a periphery of the covered insert portion 4, and the slider 63 of linear shape is formed in the part to which the slider receptacle 51 is not provided along with the insert portion 4.
[0138]
The connection part 58 is formed in the point of the slider member 55, and the proximal end of the flat spring 59 of thin length is connected to it along with the insert portion 4 in this connection part 58. The cooling units 60, such as gauze made to become wet, are provided by the point of the flat spring 59, and this cooling unit 60 is abutting the tapered surface 62 usually formed in the tip cover 61 which supports the grip part 5, as shown in Fig.24.
[0139]
Next, it describes about an operation of this embodiment constituted in this way.
The tip side of the probe 8 is made to abut the cooling unit 60 to which the tapered surface 62 is abutted by carrying out slide movement of the slider member 55 to the position shown in Fig.25 from the position shown in Fig.24 after the end of ultrasonic treatment of the organization for treatment in the abdominal cavity by the grip part 5.The tip side of the probe 8 is cooled by this.
[0140]
In this case, as shown in Fig.25, as for the slider member 55, the protruding part 57 is fixed by restricting movement of the direction of an insertion shaft with the stopper 54 and C ring 52.
[0141]
The position shown in Fig.24 is made to carry out slider movement of the slider member 55 after cooling of the probe 8 from the position shown in Fig.25.Under the present circumstances, slide movement of the protruding part 57 is carried out to the end face side by moving the end face side of the holding part 56 of the slider member 55 until it runs against the tip side of the rotating knob 50, crushing C rings 52 and 53.
[0142]
If the slider member 55 carries out slide movement, the connection part 58 and the flat spring 59 will also move to the end face side simultaneously. When the connection part 58 does slide movement, it is guided so that slide movement may be carried out along with an insertion shaft with the slider 63 provided by the periphery of the insert portion 4, without rotating.
[0143]
Slide movement of the cooling unit 60 is carried out to the end face side, sliding on the tapered surface 62 of the tip cover 61. Under the present circumstances, as shown in Fig.24, the tip side of the flat spring 59 curves.
[0144]
As for the slider member 55 moved to the position of Fig.24, the protruding part 57 is fixed when movement of the direction of an insertion shaft is restricted by C ring 53 and the rotating knob 50.
[0145]
Thus, when cooling the probe 8 after treatment, it was indicated that the ultrasonic treatment tool 401 of this embodiment performed the cooling unit 60 by making the probe 8 abut by carrying out slide movement of the slider member 55 covered by the insert portion 4 in the direction of an insertion shaft, without using a fluid.
[0146]
Since the probe which became an elevated temperature with frictional heat by ultrasonic treatment can be cooled by this even if it connects an ultrasonic treatment tool with neither returning water and an air supply device nor a suction unit, the probe after treatment can be cooled in low cost.
[0147]
Although smoke, mist, etc. which are generated during ultrasonic treatment in this case cannot be sucked, suction of smoke, mist, etc. is also realizable by using this embodiment in combination with the 1st mentioned above – a 3rd embodiment.
[0148]
A modification is shown hereafter.
In the 1st mentioned above – a 4th embodiment, although the ultrasonic treatment tool for coagulotomy was mentioned as the example and described to the medical treatment device, if it is a medical treatment device which takes a measure not only using

this but using heat, or a medical treatment device for the bottoms of an endoscope, of course, this embodiment is applicable.
[0149]
It is not necessary to say that it is applicable to the treatment implement etc. which take a measure by generating heat specifically with the high frequency treatment tool using the Joule heat by the high frequency current, etc., the laser treatment implement using a laser beam, RF treatment implement using electromagnetic waves, exothermic forceps, etc.
[0150]
(A 5th embodiment)
The figure and Fig.28 which Fig.27 made the section the ultrasonic treatment tool in which a 5th embodiment of the present invention is shown for a part of insert portion, and were shown,The expanded sectional view by the side of the proximal end of the insert portion of Fig.27 and Fig.29,The cross sectional view where the cross sectional view which is along the IIXIX–IIXIX line in Fig.28, and Fig.30 are along the expanded sectional view by the side of the tip of the insert portion of Fig.27, and Fig.31 is along the IIIXI–IIIXI line in Fig.30, and Fig.32 are the block diagrams showing the outline of the composition of the ultrasonic treatment device which has an ultrasonic treatment tool of Fig.27.
[0151]
as shown in Fig.27, the ultrasonic treatment tool 501 is inserted into the abdominal cavity -- thin -- it has the long insert portion 4, and is constituted, and the grip part 5 which is a treatment part is arranged at the tip side of the insert portion 4. The grip part 5 comprises a freely openable/closable pair of jaw, for example, grips and heats the organization for treatment in the abdominal cavity by this jaw, and deals with coagulotomy etc.
[0152]
The end face side of the insert portion 4 is connected at the tip of the rotating knob 503 which is an operating part. The rotating knob 503 is connected at the tip of the stationary handle 2 which is an operating part. The rotating knob 503 carries out rotatably operating of this insert portion 4 in the direction of the circumference of an axis by making the axial center of the insert portion 4 into a center of rotation.
[0153]
The movable handle 6 which carries out switching operation of the pair of jaw of the grip part 5 to the stationary handle 2 is attached via the supporting shaft, enabling free rotation. the tip was connected to the stationary handle 2 at the grip part 5, and the end face was connected to the vibrator 7 -- thin -- the long probe 8 is inserted in the insert portion 4, and is attached.
[0154]
Since the probe 8 performs various treatment of coagulation etc. to the organization for treatment using the heat generated with the electric power which is the electrical energy supplied from the power supply body, the part connected to the grip part 5 which is a tip side of the probe 8 constitutes the treatment part.
[0155]
The periphery of the insert portion 4 and the periphery excluding the grip part 5 side of the insert portion 4 and the tip side of the probe 8 specifically are equipped with the returning–water suction sheath 509 which is a cylindrical member. The grip part 5 and tip side of the probe 8 is projected from the sheath 509. The sheath 509 is removable to at least one copy of the periphery of the insert portion 4. That is, at least one copy of the insert portion 4 is inserted in in the sheath 509.
[0156]
As shown in Fig.28, the sheath 509, for example The body part 510 of flange shape, It has the insert portion [small diameter / body part / 510] 511 which extended from the center of this of this body part 510 to the tip side, and the connection part [small diameter / body part / 510] 515 which extended from the center of this of the body part 510 to the end face side, and the principal part is constituted.
[0157]
The inner diameter of the hole of the insert portion 511 is formed in large diameter from the outer diameter of the insert portion 4. Of this, the flow path 512 is formed between the inner circumference of the insert portion 511, and the periphery of the insert portion 4. The flow paths 510r and 510l. approximately perpendicular to the hole which communicates the body part 510 from a tip to a end face in this body part 510 are formed. The flow paths 510r and 510l. communicate the flow path 512.
[0158]
It provides so that the returning–water port 513 which is the input for connecting with the returning–water suction unit 529 (refer to Fig.32) later mentioned to the body part 510 may become approximately perpendicular to the insert portion 511. The returning–water port 513 has the flow path 513r, and this flow path 513r communicates with the flow path 510r of the body part 510. That is, in the flow path 512, the flow path 513r communicates. The air supply device which is not illustrated and connection may be possible for the returning–water port 513.
[0159]
As shown in Fig.29, the suction port 514 which is a tap hole for connecting with the pneumoperitoneum apparatus 530 (refer to Fig.32) which has a flue gas function later mentioned to the body part 510 is provided so that it may become approximately perpendicular to the insert portion 511.The suction port 514 has the flow path 514r, and this flow path 514r communicates with 510 l. of flow paths of the body part 510. That is, in the flow path 512, the flow path 514r communicates.
[0160]
If they are the ultrasonic treatment tool 501 and a range in which it does not interfere, the returning–water port 513 and the suction port 514 are not restricted approximately perpendicularly to the insert portion 511, but to the body part 510, can free the degree of setting angle and can provide it.
[0161]
The returning–water port 513 and the suction port 514 constitute the outflow entrance which performs at least 1 side of supply to the flow path 512 of the fluid supplied to the treatment part which consists of the grip part 5 and tip side of the probe 8, and the discharge from the flow path 512 of the fluid sucked out of the abdominal cavity.
[0162]
The end of the returning–water tube 531 (refer to Fig.32) which connects the returning–water port 513 and the returning–water suction unit 529 to the periphery of the returning–water port 513 and which is mentioned later is covered. The returning–water tube 531 is connectable not only with the returning–water suction unit 529 but the ultrasonic suction treatment implement 532 shown in Fig.32. In this case, the returning–water port 513 is formed in the returning–water port which the ultrasonic suction treatment implement 532 does not illustrate, and common form.
[0163]

As shown in Fig.29, the RUAROKKU cap 516 for connecting with the RUAROKKU connector which the exhaust tube 533 does not illustrate so that the exhaust tube 533 mentioned later can be connected which connects the suction port 514 and the pneumoperitoneum apparatus 530 at the tip which the suction port 514 projected is provided.

[0164]

As shown in Fig.28, the concave part 517 which carries out an opening to the connection part 515 of the body part 510 towards the end face side is provided, and the elastic member 518 which becomes the concave part 517, for example from an O ring etc. is inserted.

[0165]

The inner diameter of the hole of the O ring of the elastic member 518 is formed in the degree which can insert the insert portion 4 smaller than the outer diameter of the insert portion 4. When the insert portion 4 is inserted in the hole of the O ring of the elastic member 518, the airtightness between the insert portion 4 and the elastic member 518 is maintained by carrying out elastic deformation of the elastic member 518 between the inner peripheral surface of the concave part 517, and the insert portion 4. That is, the elastic member 518 is stuck with the periphery of the insert portion 4, where elastic deformation is carried out.

[0166]

The opening of the concave part 517 is formed in the proximal end 519 of the connection part 515, and the inner circumference of this opening is largely formed rather than the outer diameter of the insert portion 4 smaller than the path by the side of the tip of the rotating knob 503.

[0167]

At the tip of the rotating knob 503 of the ultrasonic treatment tool 501, the engagement element 544 which is at least one engagement means is provided, and the engagement receiving part 545 which is an engagement means by which engagement of the engagement element 544 is carried out to the proximal end 519 of the connection part 515 of the sheath 509 is provided.

[0168]

If engagement of the engagement element 544 and the engagement receiving part 545 is carried out after the insert portion 4 of the ultrasonic treatment tool 501 is inserted into the sheath 509, as shown in Fig.30, the engagement element 544 and the engagement receiving part 545. In the proximal end 519 and the rotating knob 503, the tip opening 543 of the sheath 509 is provided, respectively so that it may be placed at the probe 8 side which is a Fig.30 Nakashita side.

[0169]

The insert portion 4 is inserted into the sheath 509, and where engagement of the engagement element 544 and the engagement receiving part 545 is carried out, if the rotating knob 503 rotates, the rotating knob 503 and the sheath 509 will interlock and rotate by the engagement of the engagement element 544 and the engagement receiving part 545.

[0170]

Under the present circumstances, the positional relationship of the tip opening 543 of the sheath 509, and the probe 8, Not changing, when the rotating knob 503 and the sheath 509 interlock and rotate to the opening 543, Since it is always placed near the probe 8 and the grip part 5, the fluid which passed through the flow paths 513r, 510r, 512, and 526 is reliably supplied to the probe 8 and the grip part 5, and, as a result, the probe 8 and the grip part 5 are cooled. The opening 543 is placed at the near position by the side of the tip of the probe 8 from the grip part 5. That is, the opening of the opening 543 is carried out to the tip side of the probe 8 at least.

[0171]

As shown in Fig.30, the tip of the sheath 509 when the insert portion 4 is equipped with the sheath 509 is placed at the end face side rather than the grip part 5 so that the grip part 5 and tip side of the probe 8 may be exposed. The tip side of the sheath 509 is formed in tapered shape.

[0172]

As shown in Fig.31, the periphery of the insert portion 4 and the supporting part 524 with which it abuts are formed in the inner circumference by the side of the tip of the insert portion 511, and the circular arc 525 is formed in the inner circumference by the side of the tip of the insert portion 511. With the engagement position of the engagement element 544 and the engagement receiving part 545, when the circular arc 525 also equips the insert portion 4 with the sheath 509, it is placed at the Fig.30 Nakashita 8, i.e., probe, side.

[0173]

The tip flow path 526 is formed between the circular arc 525 and the periphery of the insert portion 4. The tip flow path 526 communicates with the flow path 512 formed between the inner circumference of the insert portion 511, and the periphery of the insert portion 4.

[0174]

As shown in Fig.32, the ultrasonic treatment device 500, It has the ultrasonic treatment tool 501, the ultrasonic suction treatment implement 532, the main part 527 of the electrotome, the ultrasonic output unit 528, the returning-water suction unit 529, the pneumoperitoneum apparatus 530, the electrotome switch 534, the supersonic vibration switch 535, and the returning-water suction switch 536, and the principal part is constituted.

[0175]

The vibrator 7 of the ultrasonic treatment tool 501 is connected to the ultrasonic output unit 528 which performs an ultrasonic drive with the ultrasonic cable 537. The vibrator which the ultrasonic suction treatment implement 532 does not illustrate is connectable with the ultrasonic output unit 528 similarly. The supersonic vibration switch 535 for oscillating the vibrator 7 is connected to the ultrasonic output unit 528.

[0176]

The ultrasonic output unit 528, the electrotome 527, the returning-water suction unit 529, and the pneumoperitoneum apparatus 530 of each other are electrically connected by the telecommunication cable 538 so that it can interlock and operate. The returning-water suction unit 529 is connected to the returning-water port 513 of the ultrasonic treatment tool 501 by the returning-water tube 531. The returning-water tube 531 connected to the returning-water suction unit 529 is connectable also with the returning-water port which the ultrasonic suction treatment implement 532 does not illustrate.

[0177]

The pneumoperitoneum apparatus 530 which is a suction part is connected to the suction port 514 of the ultrasonic treatment tool 501 by the exhaust tube 533. The pneumoperitoneum apparatus 530 is further connected to the known trocar 540 by the air supply tube 539. The exhaust tube 533 is also connectable with the trocar 540.

[0178]
The electrotome 527 is connectable with the ultrasonic treatment tool 501 and the ultrasonic suction treatment implement 532 with the electrotome cable 541, respectively. The returning-water suction unit 529 is connectable with the ultrasonic suction treatment implement 532 with the suction tube 542.
[0179]
When water is returned to a fluid by the returning-water suction unit 529, a fluid, After advancing into the flow path 513r of the returning-water port 513 via the returning-water tube 531 connected to the returning-water suction unit 529, it passes through the flow path 510r and the flow path 512, and water is returned from the tip opening 543 of the tip flow path 526 at the grip part 5 and tip side of the probe 8. An air supply device may be sufficient as the returning-water suction unit 529 in this case, and the fluid carried may be a gas.
[0180]
Here, the effective area product of the tip opening 543 is formed smaller than the pipeline area of the flow path 512. Therefore, since the tip flow path 526 is extracted to nozzle shape by the tip opening 543, the flow rate of the fluid to which water is returned from the tip opening 543 becomes early.
[0181]
If the cross-sectional area of A1 and the opening 543 is set to A2, this the cross-sectional area of the flow path 512, When the relation of V1A1=V2A2 (V1: the flow rate in a flow path, the V2 opening flow rate) is realized and V1 is set constant by a known Bernoulli's theorem, the flow rate V2, It is because V2 will consist of a relation of V2=V1 (A1/A2) largely to the pipeline cross-sectional area A1 according to a known Venturi effect if the value of the opening sectional area A2 is small.
[0182]
Therefore, the flow rate V2 in the opening 543 becomes largely like this embodiment as compared with the flow rate V1 in the flow path 512 by providing the one opening 543 of a small area to the pipeline area of the flow path 512.
[0183]
When the outer diameter of the sheath 509 of the ultrasonic treatment tool 501 is especially designed as 5-10 mm, it is more effective often [making the cross-sectional area A2 into 30% or less to the cross-sectional area A1], and 5 to 10% of preferably.

[0184]
Since the tip opening 543 is arranged at the probe 8 side as mentioned above, a fluid is reliably sent to both the probe 8 and the grip part 5.
[0185]
On the other hand, when fluids, such as smoke and mist, are sucked by the pneumoperitoneum apparatus 530 from the tip opening 543, After a fluid advances into the tip flow path 526 from the tip opening 543, it is discharged from the pneumoperitoneum apparatus 530 via the exhaust tube 533 which passed through the flow paths 512, 510l., and 514r, and was connected to the suction port 514.
[0186]
Next, it describes using Fig.27 - Fig.32, and Fig.33 about an operation of the ultrasonic treatment tool 501 of this embodiment constituted in this way.Fig.33 is the flow chart which showed the control method of the ultrasonic treatment device at the time of dealing with the organization for treatment in the abdominal cavity using the ultrasonic treatment tool of Fig.27.
[0187]
First, if the insert portion 4 of the ultrasonic treatment tool 501 is equipped with the sheath 509 from the proximal end side of this sheath 509 until it runs against the rotating knob 503 to the tip side of the insert portion 4, and engagement of the engagement element 544 and the engagement receiving part 545 is carried out to it, As shown in Fig.28, elastic deformation of the elastic member 518 is carried out between the inner peripheral surface of the concave part 517, and the outer peripheral surface of the insert portion 4, and it is stuck to this elastic member 518 to the insert portion 4. In this case, as mentioned above, the flow path 512 is formed between the periphery of the insert portion 4, and the inner circumference of the insert portion 511 of the sheath 509.
[0188]
Then, after the returning-water port 513 and the returning-water suction unit 529 are connected by the returning-water tube 531 and the suction port 514 and the pneumoperitoneum apparatus 530 are further connected with the exhaust tube 533, the insert portion 4 of the ultrasonic treatment tool 501 is inserted into the abdominal cavity, and treatment of the treatment organization in the abdominal cavity is performed.
[0189]
The following operations are performed by sending a control signal to the returning-water suction unit 529 and the pneumoperitoneum apparatus 530 via the telecommunication cable 538 from the control means 570 which is the control part arranged in the ultrasonic output unit 528 of the ultrasonic treatment device 500. That is, it is performed by the motion control of the control means 570.
[0190]
When dealing with the organization for treatment in the abdominal cavity, after the organization for treatment which becomes a candidate for treatment by the grip part 5 is gripped, as shown in Fig.33. First, in Step S21, the vibrator 7 performs an ultrasonic drive in response to supply of the electric power from the ultrasonic output unit 528 by carrying out ON operation of the supersonic vibration switch 535 used as a supersonic vibration switch.
[0191]
Vibration of the vibrator 7 is transmited to the grip part 5 via the probe 8. The organization for treatment is heated by this by friction with the organization for treatment by vibration of the probe 8 by the side of a tip, and treatment of coagulotomy etc. is performed.
[0192]
Subsequently, in Step S22, it is judged from the tip opening 543 to the grip part 5 and the probe 8 by the operation of the returning-water suction unit 529 whether water is returned to the fluid.
[0193]
On the other hand, when water is returned to the fluid from the tip opening 543, After returning water of the fluid from the tip opening 543 is stopped and it is again checked by branching to Step S23 and suspending the returning-water suction unit 529 that the supersonic vibration switch 535 is ON at the subsequent step S30, it shifts to Step S24. On the other hand, in Step S22,

when water is not returned to the fluid from the tip opening 543, it shifts to Step S24.
[0194]
In Step S24, it will interlock, if heating treatment of the organization for treatment is carried out by the grip part 5, and when the pneumoperitoneum apparatus 530 operates, suction of the mist and smoke which were generated on the occasion of treatment is performed. Specifically, after the fluid sucked by the pneumoperitoneum apparatus 530 advances into the tip flow path 526 from the tip opening 543, it flows through the flow paths 512, 5101, and 514r, and is discharged from the pneumoperitoneum apparatus 530 via the exhaust tube 533 connected to the suction port 514.
[0195]
After the treatment of the organization for treatment by the grip part 5 is completed, in Step S25, by carrying out the turn off operation of the switch 535, the electric power supply from the ultrasonic output unit 528 is intercepted, and the vibrator 7 stops.
[0196]
Subsequently, in conjunction with a stop of the vibrator 7, suction of the mist and smoke which were generated on the occasion of treatment is stopped by suspending the pneumoperitoneum apparatus 530 at Step S26. In this case, a stop of the pneumoperitoneum apparatus 530 may be delayed from a stop of the vibrator 7, without making it synchronize with a stop of the vibrator 7. Then, it shifts to Step S27.
[0197]
In Step S27, water is returned to a fluid from the tip opening 543 to the grip part 5 or the probe 8 by operating, only while [several seconds] the returning-water suction unit 529 is the time set up beforehand.
[0198]
Specifically the fluid supplied from the returning-water suction unit 529, After advancing into the flow path 513r of the returning-water port 513 via the returning-water tube 531, as it flows through the flow path 512 of the insert portion 511 of the sheath 509 and mentioned above from the tip opening 543 of the tip flow path 526. Water is returned by the grip part 5 or the probe 8 after the flow rate has increased according to the Venturi effect.
[0199]
The grip part 5 or BUROBU 8 heated by treatment is cooled by this. The dirt of the grip part 5 and the probe 8 adhering by treatment is removed by returning water of a fluid.
[0200]
Subsequently, in Step S28, it is judged whether the time when water was returned to the fluid has passed while [several seconds] being set up beforehand since the tip opening 543. In [if it has not passed during several seconds set up beforehand, return to Step S22, and] the subsequent step S23, The returning-water suction unit 529 is suspended for the supplied air or returning-water time of a fluid after a lapse for several seconds, and in the subsequent step 30, after OFF of the switch 535 is checked, a routine is ended.
[0201]
If the time when it returned to Step S28 at, and water was returned to the fluid from the tip opening 543 has passed while [several seconds] being set up beforehand, By shifting to Step S29 and suspending the returning-water suction unit 529, returning water of the fluid from the tip opening 543 is stopped, and a routine is completed after that.
[0202]
Thus, in the ultrasonic treatment tool 501 of this embodiment, While the flow paths 510r, 512, 513r, and 526 for returning a fluid to the ultrasonic treatment tool 501 were provided, it indicated at the time of treatment that the flow paths 510l., 512, 514r, and 526 which suck a fluid from the inside of the abdominal cavity were provided. It indicated that stage eclipse ****** 512 served as the flow path which sucks a fluid from the inside of the abdominal cavity between the insert portion 4 and the insert portion 511 while being a flow path for returning a fluid. It indicated that it provided at the tip side of the ultrasonic treatment tool 501 so that the tip opening 543 of the flow paths 510r, 5101, 512, 513r, 514r, and 526 might be placed for carrying out at the side near the probe 8.
[0203]
According to such composition, treatment using a treatment implement can be performed reliably, always securing an operator's view, since the smoke and mist which are generated in the case of ultrasonic treatment were effectively sucked via the flow paths 510l., 512, 514r, and 526 by the pneumoperitoneum apparatus 530.
[0204]
To the grip part 5 and the probe 8 which became an elevated temperature with frictional heat after ultrasonic treatment, with the returning-water suction unit 529, Since the fluid whose flow rate increased according to the Venturi effect can be returned from the opening 543 via the flow paths 510r, 512, 513r, and 526, The grip part 5 and the probe 8 which carried out treatment late-coming heat can be cooled in a short time with water supply quantity smaller than the case where the cross-sectional area A2 of the tip opening 543 is not narrowed down.
[0205]
While the tip opening 543 is provided near the probe 8, Since the tip opening 543 is placed at the probe 8 side with the engagement of the engagement element 544 and the engagement receiving part 545, though the probe 8 has turned to what kind of direction, Since a fluid can be reliably supplied to the probe 8, the probe 8 which is a heating source can be cooled reliably.
[0206]
From the above thing, the ultrasonic treatment tool 501 which improved usability can be provided for an operator. Other effects are the same as that of the ultrasonic treatment tool 1 of a 1st embodiment mentioned above.
[0207]
A modification is shown hereafter. According to the composition of the ultrasonic treatment device 500 of this embodiment, high frequency can be supplied to the ultrasonic treatment tool 501 and the ultrasonic suction treatment implement 532 from the electrotome 527 connected to the pneumoperitoneum apparatus 530 by not only suction of smoke and mist but the telecommunication cable 538 in the case of an ultrasonic output. That is, also when performing the high frequency output, the pneumoperitoneum apparatus 530 can interlock like the time of an ultrasonic output, and suction of smoke and mist can be performed.
[0208]
It indicated that the fluid to which water is returned from the tip opening 543 was used in order to cool the grip part 5 and the probe 8 after treatment. Not only in this but in this embodiment, a fluid may be used for washing in the abdominal cavity by

returning water to a fluid in the abdominal cavity.
[0209]
The ultrasonic treatment tool 501 inserted into the sheath 509 may be a high frequency treatment tool which can connect with the electrotome 527 and which is not illustrated, and even if it is in this case, returning water and suction of a fluid are possible for it like this embodiment.
[0210]
(A 6th embodiment)
Fig.34 is the flow chart which showed the control method of the ultrasonic treatment device of having an ultrasonic treatment tool in which a 6th embodiment of the present invention is shown.
[0211]
The control method of an ultrasonic treatment device of having an ultrasonic treatment tool of this embodiment differs in that suction is performed by the pneumoperitoneum apparatus 530, before heating treatment of the organization for treatment is carried out by the grip part 5 as compared with a 5th embodiment shown in Fig.33. The composition of an ultrasonic treatment tool and an ultrasonic treatment device is the same as that of a 5th embodiment. Therefore, only this point of difference is described, the same code is given to the same composition as a 5th embodiment, and that description is omitted.
[0212]
As shown in Fig.34, in Step S31, ON operation of the supersonic vibration switch 535 is carried out first, and a correspondence item is input. Subsequently, in Step S22, it is judged from the tip opening 543 to the grip part 5 and the probe 8 by the operation of the returning-water suction unit 529 whether water is returned to the fluid.
[0213]
When water is returned to the fluid from the tip opening 543, It branches to Step S23 and returning water of the fluid from the opening 543 is stopped by suspending the returning-water suction unit 529, and in the subsequent step S30, after it is checked again that the switch 535 is ON, it shifts to Step S24. In Step S22, when water is not returned to the fluid from the tip opening 543, it shifts to Step S24.
[0214]
In Step S24, a control signal is sent to the pneumoperitoneum apparatus 530 via the telecommunication cable 538 from the ultrasonic output unit 528, and suction of smoke etc. is started by the pneumoperitoneum apparatus 530. In the subsequent step S32, the control signal of a suction start is sent to the ultrasonic output unit 528 via the telecommunication cable 538 from the pneumoperitoneum apparatus 530, electric power is supplied to the vibrator 7 from the ultrasonic output unit 528 in response to it, and an ultrasonic output is started. This ultrasonic output may be started after a suction start and fixed time lapse. Then, it shifts to Step S25.
[0215]
Hereafter, since Step S25 - Step S29 are the same as Step S25 of a 5th embodiment - Step S29 which were mentioned above, the description skips them.
[0216]
Since according to this embodiment the mist and smoke at the time of taking a measure via an ultrasonic output by operating suction by the pneumoperitoneum apparatus 530 previously are reliably sucked before heating treatment of the organization for treatment is carried out using an ultrasonic wave, An operator's view can be kept good and the user-friendly ultrasonic treatment tool 501 can be provided. Other effects are the same as that of a 5th embodiment mentioned above.
[0217]
(A 7th embodiment)
The expanded sectional view by the side of the tip of the sheath of the ultrasonic treatment tool which Fig.35 shows a 7th embodiment of the present invention, and Fig.36 are cross sectional views which are along the IIIXVI-IIIXVI line in Fig.35.
[0218]
The composition of the ultrasonic treatment tool of this embodiment differs in the point which provided two or more tip openings as compared with a 5th embodiment shown in Fig.27 - Fig.33.Therefore, only this point of difference is described, the same code is given to the same composition as a 5th embodiment, and that description is omitted.
[0219]
As shown in Fig.35, the tip of the sheath 609 when the insert portion 4 of the ultrasonic treatment tool 601 is equipped with the sheath 509 of a 5th embodiment and the sheath 609 which is the cylindrical members which have the same composition is placed at the end face side rather than the grip part 5 so that the grip part 5 and tip side of the probe 8 may be exposed.
[0220]
As shown in Fig.36, the periphery of the insert portion 4 and the supporting part 624 with which it abuts are formed in the inner circumference by the side of the point of the insert portion 611, and the circular arc 625 is formed in the inner circumference of the point of the insert portion 611, for example at four places. If the formation point of the circular arc 625 is plurality, it is good without limit.
[0221]
The four tip flow paths 626 are formed between the four circular arcs 625 and the periphery of the insert portion 4, and this tip flow path 626 communicates with the flow path 612 formed between the inner circumference of the insert portion 611, and the periphery of the insert portion 4.
[0222]
Between the four circular arcs 625 and the periphery of the insert portion 4, the four tip openings 643 which are the openings by the side of four tips of the tip flow path 626 are formed. Abbreviation etc. are not spread and their sum total of the cross-sectional area of the four tip openings 643 in this embodiment is in the cross-sectional area of the tip opening 543 of a 5th embodiment. Near the probe 8, the four tip openings 643 reach grip part 5, they oppose probe 8, an opening is carried out from the grip part 5, and it is placed at the near position by the side of the tip of the probe 8 from the grip part 5. That is, the opening of the four tip openings 643 is carried out to the tip side of the probe 8 at least.
[0223]
In the ultrasonic treatment tool 601 of this embodiment, it has the composition that the engagement receiving part 545 provided by the proximal end 519 of the connection part 515 of the engagement element 544 provided at the tip of the rotating knob 503 of the ultrasonic treatment tool 501 of the 5th enforcement mentioned above and the sheath 509 is not arranged.
[0224]

According to the composition of such an ultrasonic treatment tool 601 of this embodiment, by providing two or more tip openings 643, Since it becomes unnecessary to position the tip opening 643 to the probe 8 like a 5th embodiment mentioned above, even if it inserts the insert portion 4 in every direction to the inside of the sheath 609, When a fluid is returned from the returning-water suction unit 529, water can be returned to the probe 8 and the grip part 5. Therefore, the probe 8 and the grip part 5 can be cooled reliably. Other effects are the same as that of a 5th embodiment mentioned above.

[0225]

(An 8th embodiment)

The cross sectional view where the expanded sectional view by the side of the tip of the ultrasonic treatment tool which Fig.37 shows an 8th embodiment of the present invention, and Fig.38 are along the IIIXVIII-IIIXVIII line in Fig.37, and Fig.39 are cross sectional views which are along the IIIXIX-IIIXIX line in Fig.37.

[0226]

The composition of the ultrasonic treatment tool of this embodiment differs as compared with a 5th embodiment shown in Fig.27 - Fig.33 in that side surface opening parts other than a tip opening are provided by the insert portion of the sheath.Therefore, only this point of difference is described, the same code is given to the same composition as a 5th embodiment, and that description is omitted.

[0227]

As shown in Fig.37, the tip of the sheath 709 when the insert portion 4 of the ultrasonic treatment tool 701 is equipped with the sheath 509 of a 5th embodiment and the sheath 709 which is the cylindrical members which have the same composition is placed at the end face side rather than the grip part 5 so that the grip part 5 and tip side of the probe 8 may be exposed.

[0228]

As shown in Fig.38 and Fig.39, the periphery of the insert portion 4 and the supporting part 724 with which it abuts are formed in the inner circumference by the side of the tip of the insert portion 711, and the plurality 725, for example, four circular arcs, is formed in the inner circumference by the side of the tip of the insert portion 711.

[0229]

The four tip flow paths 726 are formed between the four circular arcs 725 and the periphery of the insert portion 4, and this tip flow path 726 communicates with the flow path 712 formed in the question of the inner circumference of the insert portion 711, and the periphery of the insert portion 4.

[0230]

As shown in Fig.38 at the tip side of the insert portion 711 of the sheath 709. The four side surface opening parts 746 are provided every 90 degree in the circumferential top, and further, as shown in Fig.39, the four side surface opening parts 746 are provided from the position shown in Fig.38 also at the end face side rather than the position shown in the Fig.38 of the sheath 709 by the position shifted 45 degree to the circumferential top, respectively.

[0231]

According to such composition of the ultrasonic treatment tool 701, from the grip part 5 near the probe 8, When sucking mist and smoke with the pneumoperitoneum apparatus 530 from the tip opening 743 which an opening is carried out so that it may oppose to the tip side of the probe 8 at least, and is placed at the near position by the side of the tip of the probe 8 from the grip part 5, Though the metaphor tip opening 743 was closed by an organization and blood, suction can be performed from the side surface opening part 746. Other effects are the same as that of a 5th embodiment mentioned above.

[0232]

(A 9th embodiment)

The block diagram showing the outline of the composition of the ultrasonic treatment device with which Fig.40 has an ultrasonic treatment tool in which a 9th embodiment of the present invention is shown, and Fig.41 are the flow charts which showed the control method of the sound wave treating apparatus of Fig.40.

[0233]

As compared with a 5th embodiment that showed the control method of the ultrasonic treatment device of having an ultrasonic treatment tool of this embodiment to Fig.33, after the heating treatment of the organization for treatment by the grip part 5 differs in that suction is performed by not only returning water but the pneumoperitoneum apparatus 530. The composition of an ultrasonic treatment tool and an ultrasonic treatment device is the same as that of a 5th embodiment. Therefore, only this point of difference is described, the same code is given to the same composition as a 5th embodiment, and that description is omitted.

[0234]

As shown in Fig.40, another trocar 790 for suction which is different in the trocar 540 is connected to the pneumoperitoneum apparatus 530 of the ultrasonic treatment device 750 via the exhaust tube 783. In this embodiment, the sheath 759 does not need to have a suction port.

[0235]

As shown in Fig.41, in Step S31, ON operation of the supersonic vibration switch 535 is carried out first, and a signal is input. Subsequently, in Step S41, water is returned to the fluid by the operation of the returning-water suction unit 529 from the tip opening to the grip part 5 and the probe 8, or it is judged by operation of the pneumoperitoneum apparatus 530 whether smoke, mist, etc. are sucked from the trocar 790.

[0236]

When water is returned to a fluid from the tip opening 543 and smoke, mist, etc. are sucked with the trocar 790, By branching to Step S49 and suspending the returning-water suction unit 529 and the pneumoperitoneum apparatus 530, Returning water of the fluid from an opening is stopped and suction of the smoke of the trocar 790, mist, etc. is stopped, and in the subsequent step S50, after it is checked again that the switch 535 is ON, it shifts to Step S42. In Step S41, when water is not returned to the fluid from a tip opening, and when smoke, mist, etc. are not sucked with the trocar 790, it shifts to Step S42.

[0237]

In Step S42, the vibrator 7 performs an ultrasonic drive in response to supply of the electric power from the ultrasonic output unit 528. The organization for treatment is heated by this by friction with the organization for treatment by vibration of the probe 8 by the side of the tip of the ultrasonic treatment tool 751, and treatment of coagulotomy etc. is performed.

[0238]

In the subsequent step S43, the pneumoperitoneum apparatus 530 starts suction with the trocar 790 by sending a control signal to the pneumoperitoneum apparatus 530 via the telecommunication cable 538 from the ultrasonic output unit 528. This suction is performed at the ultrasonic drive of the vibrator 7, and the time of substantially the same.

[0239]
After the treatment of the organization for treatment by the grip part 5 is completed, in Step S44, by carrying out the turn off operation of the switch 535, the electric power supply from the ultrasonic output unit 528 is intercepted, and the vibrator 7 stops in the subsequent step S45.
[0240]
In Step S46, while water is returned to a fluid from a tip opening to the grip part 5 or the probe 8 by operating only while [several seconds] the returning-water suction unit 529 and the pneumoperitoneum apparatus 530 are the time set up beforehand, smoke, mist, etc. are sucked from the trocar 790.
[0241]
Subsequently, in Step S47, it is judged whether the time which was returned to the fluid and sucked passed while [several seconds] being set up beforehand. In [if it has not passed during several seconds set up beforehand, return to Step S41, and] the subsequent step S49, After returning water of a fluid and suction time are performed for several seconds, the returning-water suction unit 529 and the pneumoperitoneum apparatus 530 are suspended, and in the subsequent step 50, after OFF of the switch 535 is checked, a routine is ended.
[0242]
It returns to Step S47, and if the time when water was returned to the fluid at and it was sucked has passed while [several seconds] being set up beforehand, it will shift to Step S48, the returning-water suction unit 529 and the pneumoperitoneum apparatus 530 will be suspended, and a routine will be completed after that.
[0243]
Thus, according to this embodiment, after ultrasonic treatment, since suctioning operation is extensible and suction of mist or smoke can be performed more for a long time, an operator's view can be kept good. Other effects are the same as that of a 5th embodiment mentioned above.
[0244]
(A 10th embodiment)
The expanded sectional view by the side of the proximal end of the insert portion of the ultrasonic treatment tool which Fig.42 shows a 10th embodiment of the present invention, and Fig.43 are cross sectional views which are along the IVXIII-IVXIII line in Fig.42.
[0245]
When the composition of the ultrasonic treatment tool of this embodiment rotates a rotating knob as compared with a 5th embodiment shown in Fig.27 - Fig.33, it differs in that the ultrasonic treatment tool has the structure of preventing ****** of the returning-water tube connected to the returning-water port, and the exhaust tube connected to the suction port.Therefore, only this point of difference is described, the same code is given to the same composition as a 5th embodiment, and that description is omitted.
[0246]
As shown in Fig.42, the principal part comprises the rotating part 850 by which the sheath 809 which is a cylindrical member of the ultrasonic treatment tool 801 of this embodiment was provided inside the body part 810 and this body part 810.
[0247]
As for the tip [of the rotating part 850], and end face side, the projecting part 853 is formed in each, and the projecting part 853 is touched by the elastic plate 854 arranged by each at the tip [between the body part 810 and the rotating part 850], and end face side only at the peak.
[0248]
The inner diameter of the hole of the insert portion 811 is formed in large diameter rather than the insert portion 4. Of this, the flow path 812 is formed between the inner circumference of the insert portion 811, and the periphery of the insert portion 4. Two or more holes 852 are formed in the rotating part 850 along with the circumferential direction, and the hole 852 of this plurality communicates space 851 between the flow path 812, and the inner circumference of the body part 810 and the periphery of the rotating part 850. Therefore, space 851 and the flow path 812 communicate.
[0249]
As shown in Fig.43, the returning-water port 813 which is the input for connecting with the returning-water suction unit 529 at the body part 810 is provided. The returning-water tube 531 for connecting with the returning-water suction unit 529 is connected to the returning-water port 813.
[0250]
The returning-water port 813 has the flow path 813r, and this flow path 813r communicates with the flow path 810r of the body part 810. The flow path 813r communicates with space 851, and, thereby, the flow path 813r communicates with the flow path 812.
[0251]
The suction port 814 which is a tap hole for connecting with the pneumoperitoneum apparatus 530 which has a flue gas function in the body part 810 is provided. The exhaust tube 533 for connecting with the pneumoperitoneum apparatus 530 is connected to the suction port 814.
[0252]
The suction port 814 has the flow path 814r, and this flow path 814r communicates with 810 l. of flow paths of the body part 810. The flow path 814r communicates with space 851, and, thereby, this flow path 814r communicates with the flow path 812.
[0253]
The returning-water port 813 and the suction port 814 constitute the outflow entrance which performs at least 1 side of supply to the flow path 812 of the fluid supplied to the treatment part which consists of the grip part 5 and tip side of the probe 8, and the discharge from the flow path 812 of the fluid sucked out of the abdominal cavity.
[0254]
The concave part which carries out an opening to the proximal end 819 of the rotating part 850 towards the end face side is provided, and the elastic member 818 which becomes a concave part, for example from an O ring etc. is inserted. The inner diameter of the hole of the O ring of the elastic member 818 is formed in the degree which can insert the insert portion 4 smaller than the outer diameter of the insert portion 4, When the insert portion 4 is inserted in the hole of the O ring of the elastic member 818, between a concave part and the insert portion 4, elastic deformation of the elastic member 818 is carried out, and airtightness is maintained between the insert portion 4 and the elastic member 818. That is, it is stuck with the periphery of the

insert portion 4 in the state where it deformed. The inner circumference of the opening of a concave part is largely formed rather than the outer diameter of the insert portion 4 smaller than the path by the side of the tip of the rotating knob 803.
[0255]
The rotating part 850 of the ultrasonic treatment tool 801 which has such composition, Since it is in contact with the elastic plate 854 only at the peak of the projecting part 853 and the peripheral part of other rotating parts 850 does not touch, if the rotating knob 803 is rotated, the insert portion 4 will be interlocked with and the rotating part 850 will rotate to the body part 810. That is, only the rotating part 850 rotates separately from the body part 810.
[0256]
When rotating the rotating knob 803, ****** of the returning-water tube 531 connected to the returning-water port 813 and the exhaust tube 533 connected to the suction port 814 is prevented by this. Other effects are the same as that of a 5th embodiment mentioned above.
[0257]
(An 11th embodiment)
Fig.44 is the figure having made a part of insert portion the section and in which showing the ultrasonic treatment tool in which an 11th embodiment of the present invention is shown.
[0258]
The composition of the ultrasonic treatment tool of this embodiment differs in that the ultrasonic treatment tool has the structure which can return a fluid with sufficient operativity as compared with a 5th embodiment shown in Fig.27 - Fig.33.Therefore, only this point of difference is described, the same code is given to the same composition as a 5th embodiment, and that description is omitted.
[0259]
As shown in Fig.44, the insert portion 4 of the ultrasonic treatment tool 901 is equipped with the sheath 909 which is a cylindrical member, and the returning-water port 913 which has input in the sheath 909 is formed. In the returning-water port 913, the returning-water tube 931 is freely attachable/detachable, and this returning-water tube 931 is connected to the fluid supplying source 965 which is a fluid supply part. The returning-water tube 931 may be connected to the returning-water suction unit 529 in this case.
[0260]
The lever 964 which is a means for switching of the pinch valve 960 is attached to the stationary handle 902 which is an operating part by the side of the end face of the insert portion 4 via the mounting part 967 which is an attaching means, and the protruding part 962 which can abut freely on some returning-water tubes 931 is provided by the lever 964. The pinch valve 960 may be freely attachable/detachable to the stationary handle 902 in the mounting part 967.
[0261]
When not returning a fluid from the tip opening 943, the protruding part 962 presses some returning-water tubes 931, and it crushes some returning-water tubes 931 so that a fluid may not pass through the inside of the returning-water tube 931.
[0262]
When returning water, and the end side of the lever 964 rotates to an arrow direction among Fig.44, the lever 964 rotates focusing on the fulcrum 961, and it rotates in the direction which the protruding part 962 separates from the returning-water tube 931. Since the flow path of the returning-water tube 931 is opened by this, from the grip part 5, near the probe 8, the opening of it is carried out by it so that it may oppose to the tip side of the probe 8 at least, and it is returned to a fluid from the tip opening 943 which is placed at the near position by the side of the tip of the probe 8 from the grip part 5.
[0263]
In stopping returning water of a fluid, the lever 964 returns to the position of the origin which crushes some returning-water tubes 931 by operation of the spring 963 by releasing operation of the lever 964 by an operator.
[0264]
According to such composition, returning-water operation of the fluid from the tip opening 943 through the flow path 912 can be easily performed with sufficient operativity in the midst of treatment to the timing which an operator means. Other effects are the same as that of a 5th embodiment mentioned above.
[0265]
[Additional remark]
As explained in full detail above, according to the embodiment of the present invention, the composition like the following can be obtained. namely
(1) The insert portion of thin length inserted into the abdominal cavity,
The treatment part which is provided at the tip of the aforementioned insert portion and takes a measure by heating the organization for treatment in the aforementioned abdominal cavity,
The cylindrical member in which at least one copy of the aforementioned insert portion is inserted,
The flow path through which at least 1 side of the fluid which is formed between the periphery of the aforementioned insert portion and the inner circumference of the aforementioned cylindrical member, and is supplied to the aforementioned treatment part, and the fluid sucked out of the aforementioned abdominal cavity flows,
The outflow entrance which performs at least 1 side of supply to the aforementioned flow path of the fluid which communicates the aforementioned flow path and is supplied to the aforementioned treatment part, and the discharge from the aforementioned flow path of the fluid sucked out of the aforementioned abdominal cavity,
The opening by which communicated the aforementioned flow path, and the opening was opposed and carried out to the aforementioned treatment part,
The providing medical treatment device.
[0266]
(2) The insert portion of thin length inserted into the abdominal cavity,
The treatment part which is provided at the tip of the aforementioned insert portion and takes a measure by adding heat to the organization for treatment in the aforementioned abdominal cavity,
The cylindrical member of the hollow and long picture which project and arrange the aforementioned treatment part to the tip side outside while covering from the near side of the aforementioned insert portion to the tip side,
It is formed of space between the aforementioned insert portion made to insert in the aforementioned cylindrical member, and the inner peripheral surface of the aforementioned cylindrical member, and is a flow path which can pass a fluid from the near

side of the aforementioned cylindrical member to the tip side,
The cap for fluid supplies linked to the fluid supplying source which supplies the aforementioned fluid which communicates the aforementioned flow path, is provided by the near side of the aforementioned cylindrical member, and is supplied to the tip side of the aforementioned cylindrical member via the aforementioned flow path,
The cap for suction linked to the suction sources which communicate the aforementioned flow path, are provided by the near side of the aforementioned cylindrical member, and suck the aforementioned fluid from the tip side of the aforementioned cylindrical member via the aforementioned flow path,
The opening which could supply the fluid to the aforementioned treatment part projected and arranged from the tip of the aforementioned cylindrical member via the aforementioned flow path from the aforementioned cap for fluid supplies, and was provided by the point of the aforementioned cylindrical member which sucks the aforementioned fluid near [aforementioned] the treatment part via the aforementioned flow path from the aforementioned suction cap,
The providing medical treatment device.
[0267]
(3) The medical treatment device of the description to the additional remark 1 or 2 while the aforementioned cylindrical member is formed in large diameter rather than the path of the aforementioned insert portion in which the path of the aforementioned inner peripheral surface was inserted, wherein the aforementioned treatment part provided at the tip of the aforementioned insert portion from the aforementioned cylindrical member is projected.
[0268]
(4) It is attached to the aforementioned insert portion of the medical treatment device which has a long and slender long picture insert portion for inserting into the treatment part for taking a measure using heat, and the abdominal cavity freely attachable/detachable, A channel for a wrap cylindrical member and the aforementioned cylindrical member to let the aforementioned insert portion pass for the aforementioned insert portion is provided, The medical treatment device equipping the flow path and the aforementioned flow path for having an opening, and furthermore returning water and sucking near [aforementioned] a treatment part with the returning-water suction implement possessing the cap for connecting with the source of returning water, and suction sources.
[0269]
(5) The medical treatment device of the description to the additional remark 4 forming the aforementioned flow path by space made between the aforementioned insert portions in the state where have the form and the dimension which the aforementioned channel does not stick over the aforementioned insert portion and the whole circumference, and it attached to the aforementioned insert portion.
[0270]
(6) Returning water for medical treatment devices, the suction control system detecting the output of the medical treatment device of the description of control of the aforementioned returning water and suction to the additional remarks 1-5, and performing it.
[0271]
(7) Returning water for medical treatment devices of the description to the additional remark 6, wherein the aforementioned medical treatment device is an ultrasonic coagulotomy treatment implement, a suction system.
[0272]
(8) Returning water for medical treatment devices of the description to the additional remark 6, wherein the aforementioned medical treatment device is a high frequency treatment tool, a suction system.
[0273]
(9) Returning water for medical treatment devices of the description to the additional remark 6, wherein the aforementioned medical treatment device is a laser treatment implement, a suction system.
[0274]
(10) The medical treatment device which has a treatment part for taking a measure using heat, and a long and slender long picture insert portion inserted into the abdominal cavity, Returning water for medical treatment devices, the suction system which it has an opening near [aforementioned] a treatment part, and the flow path returned and sucked in the aforementioned insert portion at the aforementioned treatment part is arranged, and are further characterized by providing the cap for connecting with the aforementioned insert portion proximal end with the source of returning water, and suction sources in the aforementioned flow path.
[0275]
(11) Returning water for medical treatment devices of the description to the additional remark 10 provided with the equipment which controls timing and time when performing returning water and suction to the aforementioned treatment part, a suction system.
[0276]
(12) The heating part which constitutes the aforementioned treatment part,
The grip part which constitutes the aforementioned treatment part, and is opened and closed to the aforementioned heating part,

It consists of a driving shaft of the thin length who connects and does a switching action to the aforementioned grip part,
Returning water for medical treatment devices of the description to the additional remark 10 forming the aforementioned flow path by space made between the aforementioned insert portions in the state where have the form and the dimension which the channel for letting the aforementioned driving shaft pass does not stick over the aforementioned insert portion and the whole circumference, and it attached to the aforementioned insert portion, a suction system.
[0277]
(13) The heating part of the thin length from whom the tip side constitutes the aforementioned treatment part at least,
Returning water for medical treatment devices of the description to the additional remark 10 forming the aforementioned flow path by space made between the aforementioned insert portions in the state where have the form and the dimension which the channel for letting the aforementioned heating part pass does not stick over the aforementioned insert portion and the whole circumference, and it attached to the aforementioned insert portion, a suction system.
[0278]
(14) Returning water for medical treatment devices of the description to the additional remark 10 detecting the output of the aforementioned medical treatment device and performing control of the aforementioned returning water and suction, a suction

system.
[0279]
(15) Returning water for medical treatment devices of the description to the additional remark 10, wherein the aforementioned medical treatment device is an ultrasonic coagulotomy treatment implement, a suction system.
[0280]
(16) Returning water for medical treatment devices of the description to the additional remark 10, wherein the aforementioned medical treatment device is a high frequency treatment tool, a suction system.
[0281]
(17) Returning water for medical treatment devices of the description to the additional remark 10, wherein the aforementioned medical treatment device is a laser treatment implement, a suction system.
[0282]
(18) The medical treatment device providing the form for a heat sink to the aforementioned treatment part in the medical treatment device which has a long and slender long picture insert portion for inserting into the treatment part for taking a measure using heat, and the abdominal cavity
(19) In the medical treatment device which has a long and slender long picture insert portion for inserting into the treatment part for taking a measure using heat, and the abdominal cavity, A cooling system for medical treatment devices contacting the aforementioned cooling member to the aforementioned treatment part, and cooling the aforementioned treatment part by holding the cooling member and the aforementioned cooling member for carrying out the endothermic of the heat of the aforementioned treatment part, having a movable cooling system along with an insert portion, and operating the aforementioned cooling system after treatment.
[0283]
(20) A cooling system for medical treatment devices of the description to the additional remark 19, wherein the aforementioned cooling member is a blanket-like component dipped in the physiological saline.
[0284]
(21) A cooling system for medical treatment devices of the description to the additional remark 19, wherein the aforementioned cooling member consists of material with biocompatibility.
[0285]
(22) The medical treatment device of the description to the additional remark 1 to which the cross-sectional area of the aforementioned opening is characterized by being smaller than the cross-sectional area of the aforementioned flow path.
[0286]
(23) The aforementioned treatment part consists of a freely openable/closable opening/closing part to the heating part which heats the aforementioned organization for treatment, and this heating part,
The medical treatment device of the description to the additional remark 1 or 22 currently opposing and carrying out the opening of the aforementioned opening to the aforementioned heating part at least.
[0287]
(24) The medical treatment device of the description to the additional remark 22, wherein the cross-sectional areas of the aforementioned opening constitute 30% or less of the cross-sectional areas of the aforementioned flow path.
[0288]
(25) The operating knob which is provided at the end face side of the aforementioned insert portion, and rotates the aforementioned insert portion to an axial direction,
The engagement means engaged [cylindrical member / aforementioned] in the aforementioned operating knob and the aforementioned cylindrical member rotatable with the aforementioned insert portion by the rotating operation of the aforementioned operating knob,
The medical treatment device of the description to the providing additional remark 23.
[0289]
(26) The medical treatment device of the description to the additional remark 23, wherein the aforementioned heating part is a probe which transmits supersonic vibration.
[0290]
(27) The insert portion of thin length inserted into the abdominal cavity,
The treatment part which is provided at the tip of the aforementioned insert portion and takes a measure by heating the organization for treatment in the aforementioned abdominal cavity by supplying electrical energy from a power supply,
The cylindrical member in which at least one copy of the aforementioned insert portion is inserted,
The flow path through which the fluid which is formed between the periphery of the aforementioned insert portion and the inner circumference of the aforementioned cylindrical member, and is sucked out of the aforementioned abdominal cavity flows,
The tap hole which discharges the fluid which communicates the aforementioned flow path and is sucked out of the aforementioned abdominal cavity from the aforementioned flow path,
The opening which communicated the aforementioned flow path and was provided by the near position of the aforementioned treatment part,
The suction part which is connected to the aforementioned tap hole and sucks a fluid,
The control part which electrical energy is supplied from the aforementioned power supply, the aforementioned treatment part precedes heating the aforementioned organization for treatment, and predetermined makes carry out the time operation of the aforementioned suction part,
The providing medical treatment device.
[0291]
(28) The insert portion of thin length inserted into the abdominal cavity,
The treatment part which is provided at the tip of the aforementioned insert portion and takes a measure by heating the organization for treatment in the aforementioned abdominal cavity,
The operating part which operates the aforementioned treatment part provided by the end face of the aforementioned insert portion,
The cylindrical member in which at least one copy of the aforementioned insert portion is inserted,
The flow path through which the fluid which is formed between the periphery of the aforementioned insert portion and the inner circumference of the aforementioned cylindrical member, and is supplied to the aforementioned treatment part flows,

Input which flows into this flow path the fluid which communicates the aforementioned flow path and is supplied to the aforementioned treatment part,
The opening which communicated the aforementioned flow path and was provided by the near position of the aforementioned treatment part,
The fluid supply part which supplies a fluid to the aforementioned input,
The changeover section which is provided between the aforementioned input and the aforementioned fluid supply part, and turns supply of a fluid on and off,
The attaching means which makes the aforementioned control part freely attachable/detachable to the aforementioned grip part,
The providing medical treatment device.
[0292]
The additional remarks 1-9 are equipping the insert portion of a medical treatment device with a returning-water suction sheath, and form a returning-water suction passage in the gap made on the inside of a returning-water suction sheath, and the outside of the insert portion. Mist suction, returning water, and a supplied air were to be made by making the returning-water suction port provided by the opening and returning-water suction passage which were provided at the tip side, and the returning-water suction sheath by this communicate. It sucks at the time of an output, and an output is detected and returning-water suction is controlled by performing suction for several seconds at the time of an output halt.
[0293]
The additional remarks 10-15 provide a returning-water suction port to the rotating knob of an ultrasonic treatment tool, make a returning-water suction port, the driving shaft channel which is the pipelines along which the driving shaft for making a grip part drive passes, and the opening provided at the tip of an inside sheath communicate, and enabled it to perform returning-water suction. It sucks at the time of an output, and an output is detected and returning-water suction is controlled by performing suction for several seconds at the time of an output halt.
[0294]
The additional remarks 5, 7, 9, and 11 interlock the power supply body, returning water and an air supply device, and suction unit of the above-mentioned ultrasonic treatment tool. Returning water and an air supply device, and a suction unit are connected to a returning-water port with a tube.
[0295]
The surface area of a probe is enlarged by providing a slot on the lower surface of a probe, and the temperature of the probe which went up by ultrasonic treatment was made for the additional remark 16 to radiate heat easily.
[0296]
The additional remarks 17-19 provide the component for cooling on the lower surface of a probe, and tended to have cooled the temperature of the probe which went up by ultrasonic treatment by a cooling member being applied to a probe.
[Brief Description of the Drawings]
[0297]
[Drawing 1]The figure in which a part of insert portion's having made the section the ultrasonic treatment tool in which a 1st embodiment of the present invention is shown, and showing it.
[Drawing 2]The expanded sectional view by the side of the proximal end of the insert portion of Fig.1.
[Drawing 3]The figure showing the modification which provided the grip slot on the periphery of the connection screw in Fig.2.
[Drawing 4]The figure expanding and showing the tip side of the insert portion of Fig.1.
[Drawing 5]The cross sectional view which is along the V-V line in Fig.4.
[Drawing 6]The block diagram showing the outline of the composition of the ultrasonic treatment device which has an ultrasonic treatment tool of Fig.1.
[Drawing 7]The exploded view which freed itself from the insert portion 4 of the ultrasonic treatment tool 1 of Fig.1 to the sheath 9.
[Drawing 8]The flow chart which showed the control method of the ultrasonic treatment device at the time of dealing with the organization for treatment in the abdominal cavity using the ultrasonic treatment tool of Fig.1.
[Drawing 9]The figure showing the state where the tip side of a grip part was moved for the tip side of the insert portion of the sheath of Fig.1 to the wrap position.
[Drawing 10]The figure in which a part of insert portion's having made the section the ultrasonic treatment tool in which a 2nd embodiment of the present invention is shown, and showing it.
[Drawing 11]The expanded sectional view by the side of the proximal end of the insert portion of Fig.10.
[Drawing 12]The expanded sectional view by the side of the point of the insert portion of Fig.10.
[Drawing 13]The figure in which a part of insert portion's having made the section the ultrasonic treatment tool in which a 3rd embodiment of the present invention is shown, and showing it.
[Drawing 14]The cross sectional view which is along the XIV-XIV line in Fig.13.
[Drawing 15]The expanded sectional view by the side of the proximal end of the insert portion of Fig.13.
[Drawing 16]The expanded sectional view by the side of the point of the insert portion of Fig.13.
[Drawing 17]The cross sectional view which is along the XVII-XVII line in Fig.16.
[Drawing 18]The fragmentary sectional view showing the modification which provided the slot in the position which opposes to Fig.1, Fig.10, and the grip part of the probe of the ultrasonic treatment tool of Fig.13.
[Drawing 19]The fragmentary sectional view showing the modification which provided one port which commonalized the returning-water supplied-air port and the suction port in the ultrasonic treatment tool of Fig.1.
[Drawing 20]The expanded sectional view by the side of the proximal end of the insert portion of Fig.19.
[Drawing 21]The block diagram showing the outline of the composition of the ultrasonic treatment device which has an ultrasonic treatment tool of Fig.19.
[Drawing 22]The block diagram showing the outline of another composition of the ultrasonic treatment device of Fig.21.
[Drawing 23]The figure in which a part of insert portion's having made the section the ultrasonic treatment tool in which a 4th embodiment of the present invention is shown, and showing it.
[Drawing 24]The figure expanding and showing the point side of the insert portion of Fig.23.
[Drawing 25]The figure showing the state where the slider member of Fig.24 was moved at the tip of the direction of an insertion shaft.
[Drawing 26]The cross sectional view which is along the IIXVI-IIXVI line in Fig.25.

[Drawing 27]The figure in which a part of insert portion's having made the section the ultrasonic treatment tool in which a 5th embodiment of the present invention is shown, and showing it.
[Drawing 28]The expanded sectional view by the side of the proximal end of the insert portion of Fig.27.
[Drawing 29]The cross sectional view which is along the IIXIX–IIXIX line in Fig.28.
[Drawing 30]The expanded sectional view by the side of the tip of the insert portion of Fig.27.
[Drawing 31]The cross sectional view which is along the IIIXI–IIIXI line in Fig.30.
[Drawing 32]The block diagram showing the outline of the composition of the ultrasonic treatment device which has an ultrasonic treatment tool of Fig.27.
[Drawing 33]The flow chart which showed the control method of the ultrasonic treatment device at the time of dealing with the organization for treatment in the abdominal cavity using the ultrasonic treatment tool of Fig.27.
[Drawing 34]The flow chart which showed the control method of the ultrasonic treatment device of having an ultrasonic treatment tool in which a 6th embodiment of the present invention is shown.
[Drawing 35]The expanded sectional view by the side of the tip of the sheath of the ultrasonic treatment tool in which a 7th embodiment of the present invention is shown.
[Drawing 36]The cross sectional view which is along the IIIXVI–IIIXVI line in Fig.35.
[Drawing 37]The expanded sectional view by the side of the tip of the ultrasonic treatment tool in which an 8th embodiment of the present invention is shown.
[Drawing 38]The cross sectional view which is along the IIIXVIII–IIIXVIII line in Fig.37.
[Drawing 39]The cross sectional view which is along the IIIXIX–IIIXIX line in Fig.37.
[Drawing 40]The block diagram showing the outline of the composition of the ultrasonic treatment device which has an ultrasonic treatment tool in which a 9th embodiment of the present invention is shown.
[Drawing 41]The flow chart which showed the control method of the sound wave treating apparatus of Fig.40.
[Drawing 42]The expanded sectional view by the side of the proximal end of the insert portion of the ultrasonic treatment tool in which a 10th embodiment of the present invention is shown.
[Drawing 43]The cross sectional view which is along the IVXIII–IVXIII line in Fig.42.
[Drawing 44]The figure having made a part of insert portion the section and in which showing the ultrasonic treatment tool in which an 11th embodiment of the present invention is shown.
[Explanations of letters or numerals]
[0298]
1 -- Ultrasonic treatment tool
4 -- Insert portion
5 -- Grip part
8 -- Probe
9 -- Returning-water suction sheath
10l -- Flow path
10r -- Flow path
12 -- Flow path
13 -- Returning-water supplied-air port
13r -- Flow path
14 -- Suction port
14r -- Flow path
26 -- Tip flow path
29 -- Returning water and air supply device
30 -- Suction unit
37 -- Rotating knob
38 -- Space
40 -- Driving shaft channel
42 -- Rotating knob
47 -- Tip flow path
201 -- Ultrasonic treatment tool
301 -- Ultrasonic treatment tool
312 -- Flow path
323 -- Common port
323r -- Flow path
501 -- Ultrasonic treatment tool
509 -- Sheath
512 -- Flow path
513 -- Returning-water port
514 -- Suction port
543 -- Tip opening
601 -- Ultrasonic treatment tool
609 -- Sheath
612 -- Flow path
643 -- Tip opening
701 -- Ultrasonic treatment tool
709 -- Sheath
712 -- Flow path
743 -- Tip opening
801 -- Ultrasonic treatment tool
809 -- Sheath
812 -- Flow path
813 -- Returning-water port

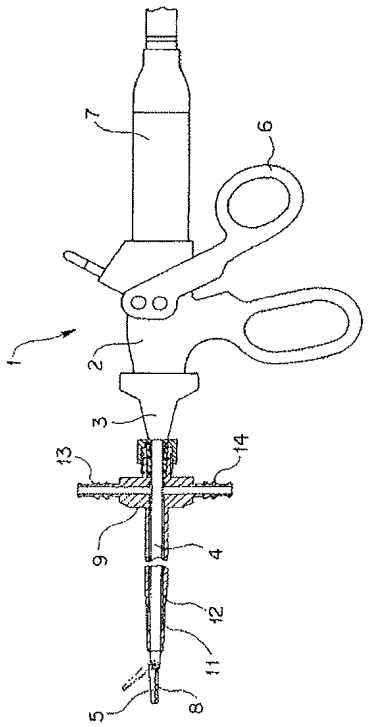
814 -- Suction port
901 -- Ultrasonic treatment tool
909 -- Sheath
912 -- Flow path
913 -- Returning-water port
943 -- Tip opening
A1 -- Cross-sectional area of a flow path
A2 -- Cross-sectional area of an opening

[Translation done.]

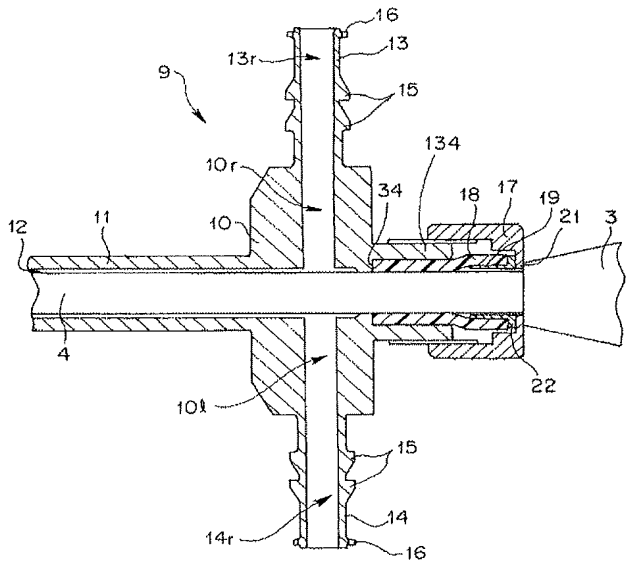
* NOTICES *

DRAWINGS

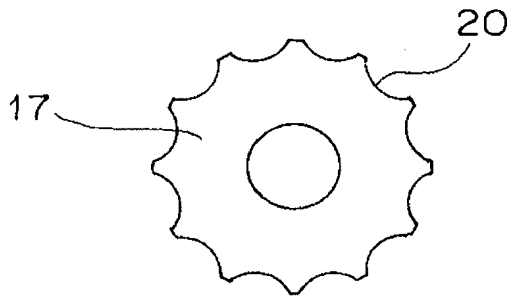
[Drawing 1]



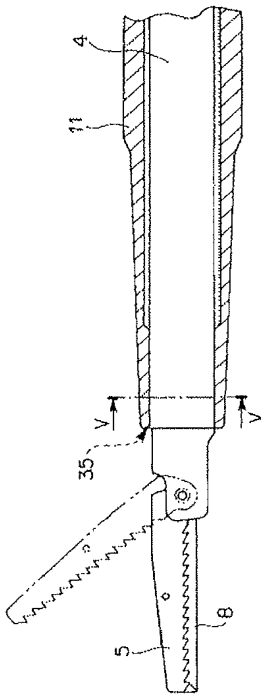
[Drawing 2]



[Drawing 3]



[Drawing 4]



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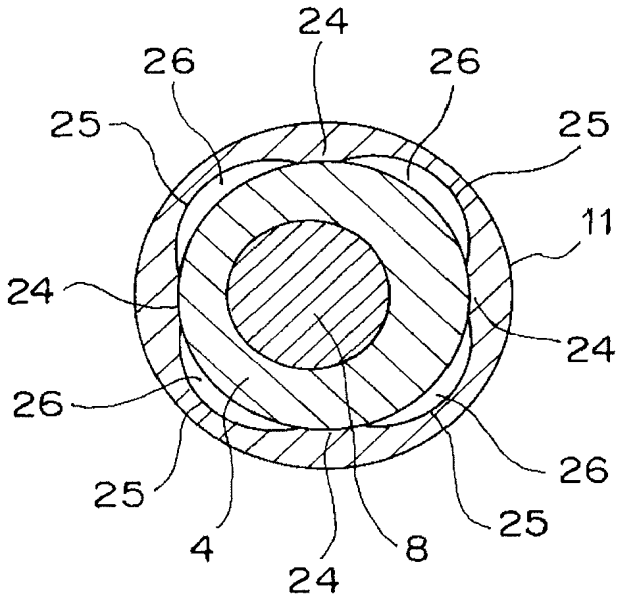

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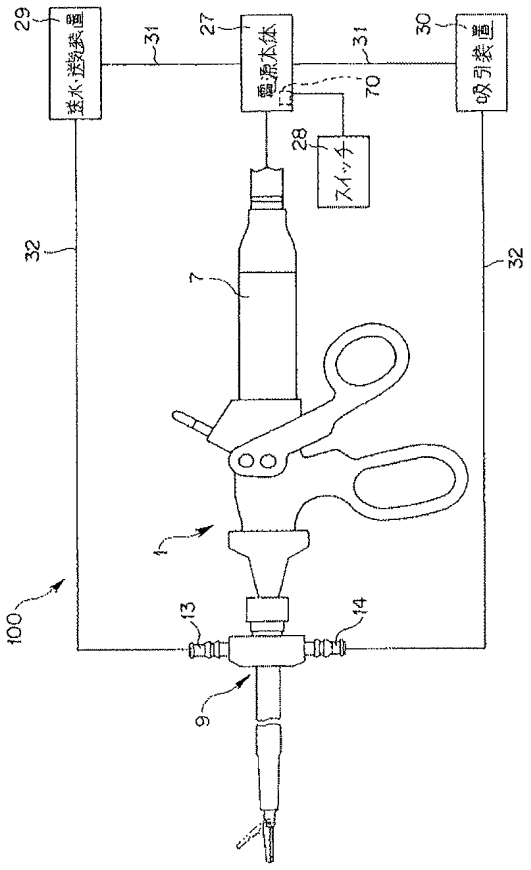

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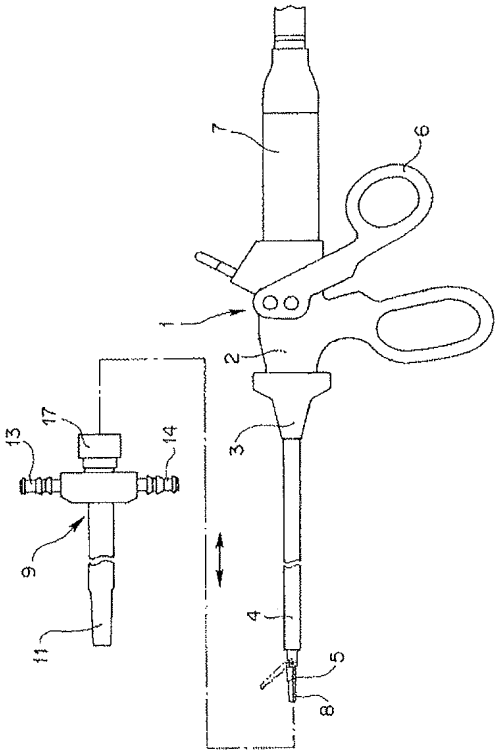
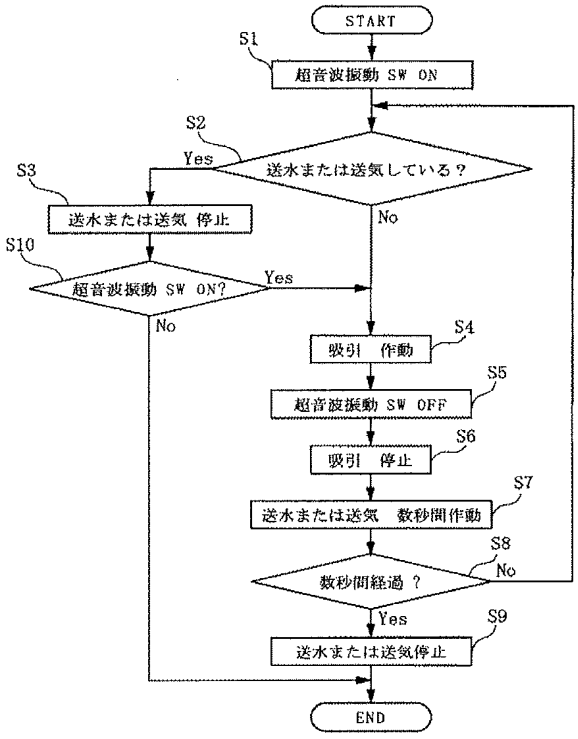
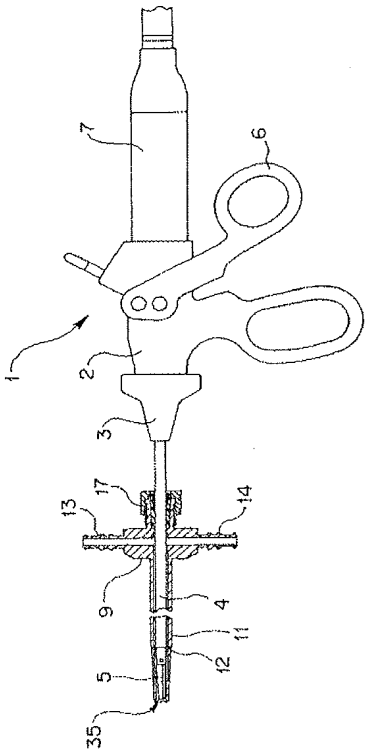


[Drawing 8]



[Drawing 9]



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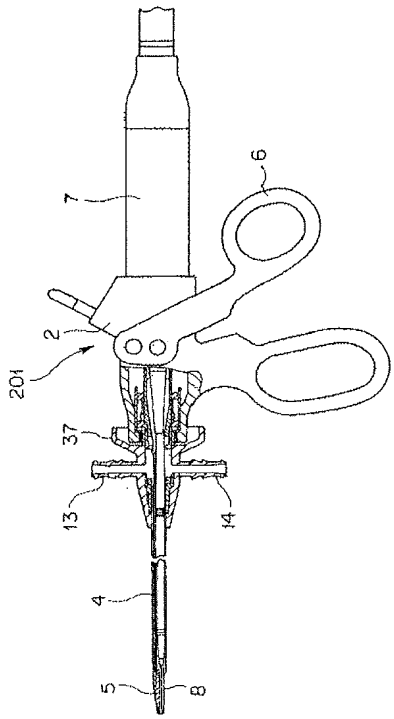

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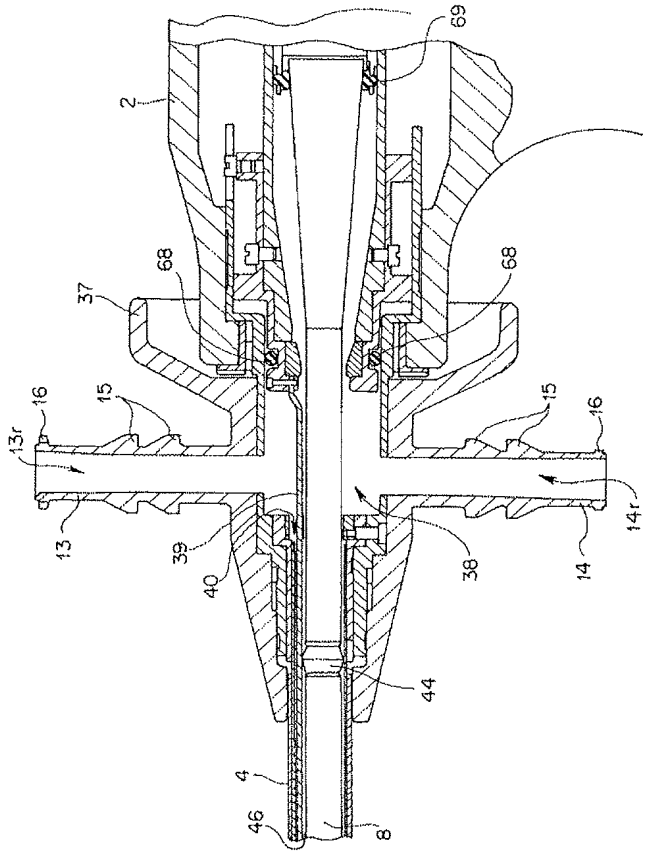

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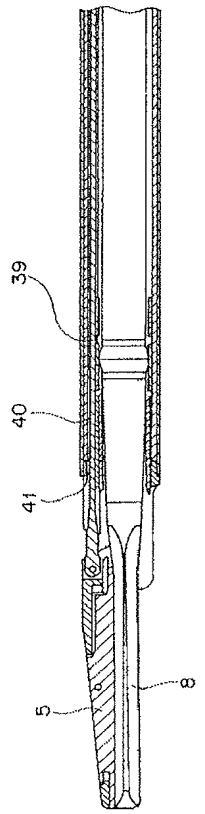

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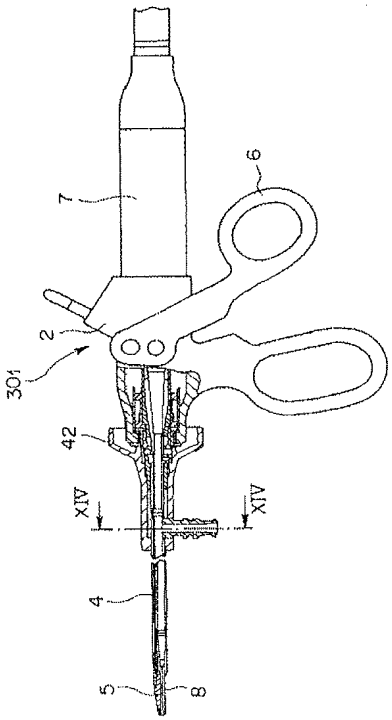

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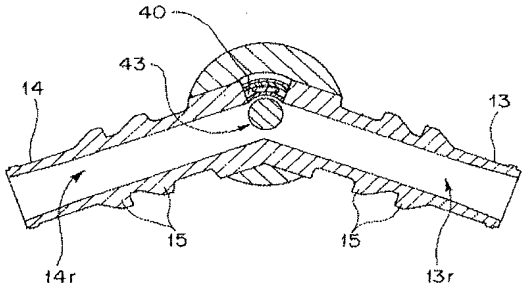

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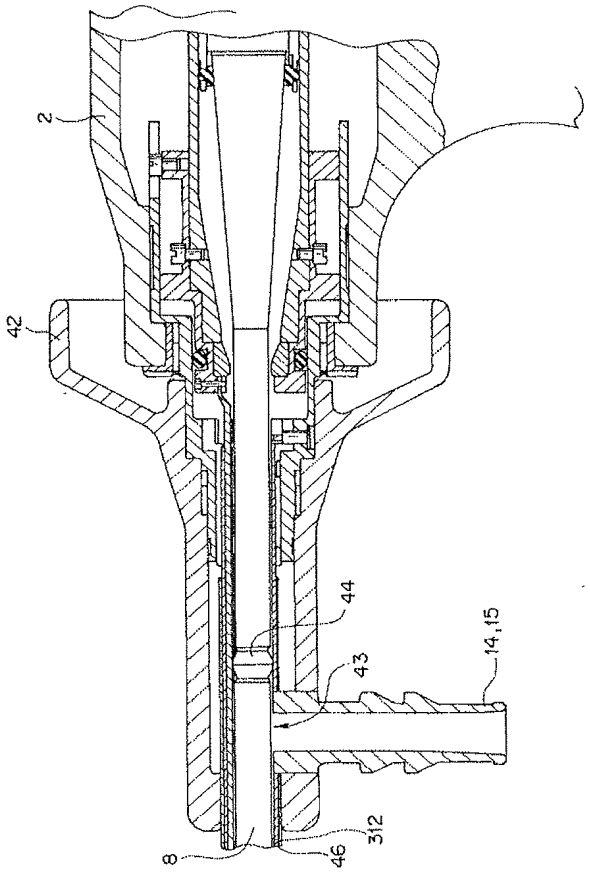

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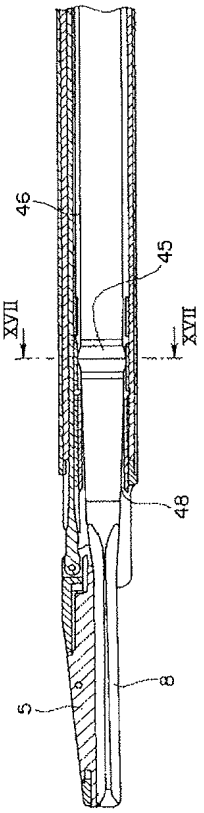

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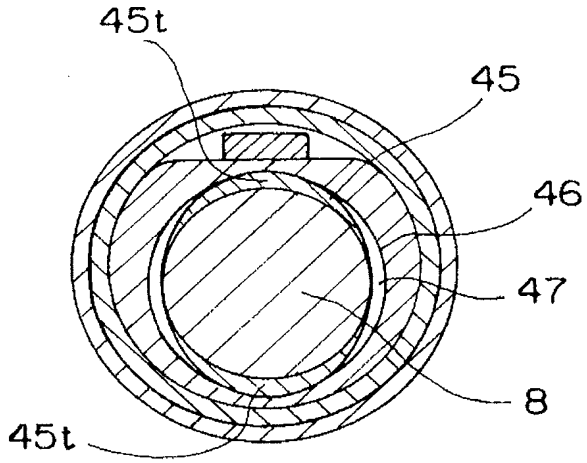

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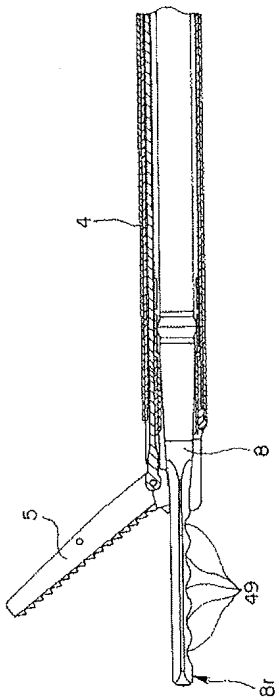

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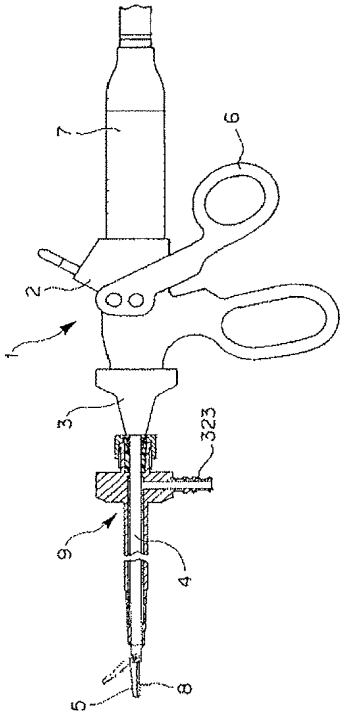

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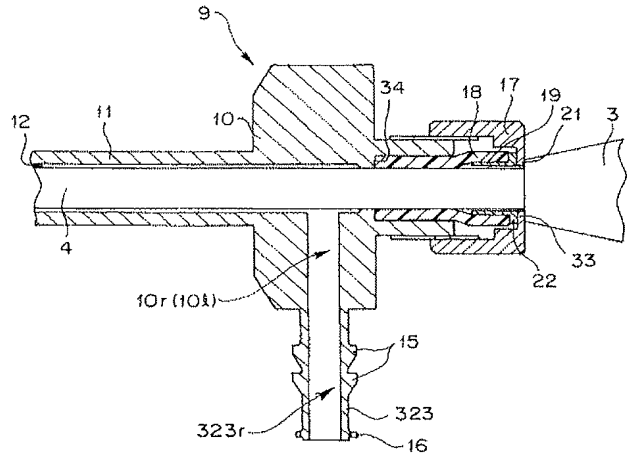

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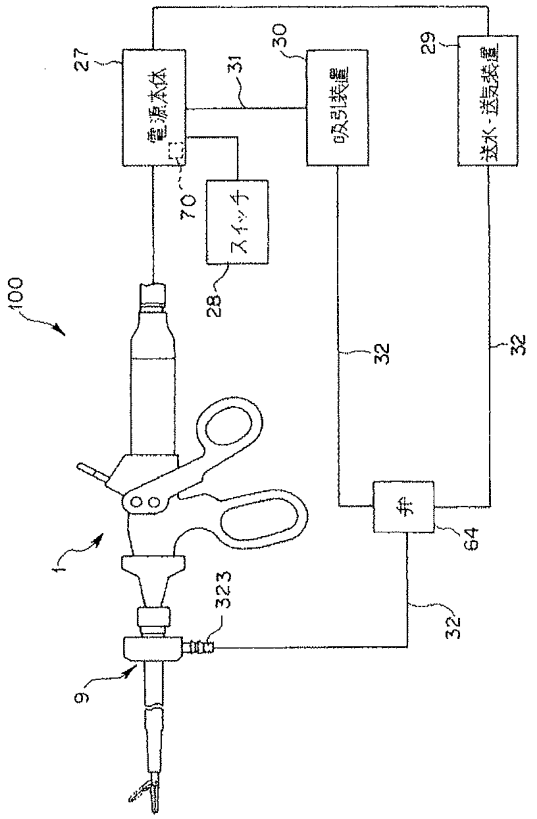
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31
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吸引装置
29
送水・送気装置
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スイッチ
28
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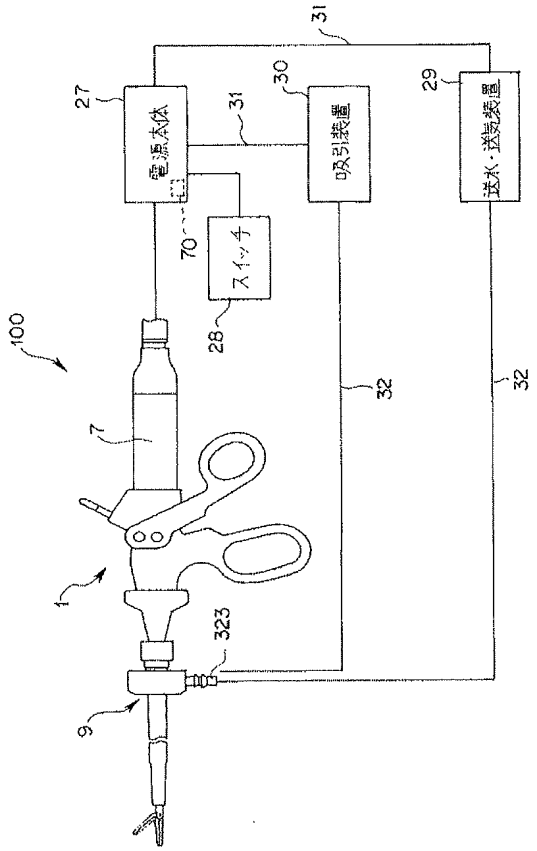
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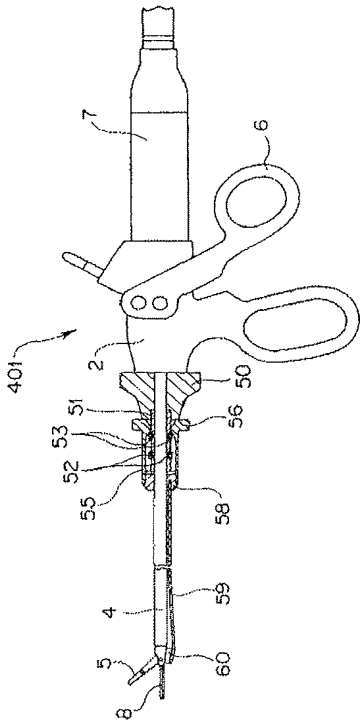

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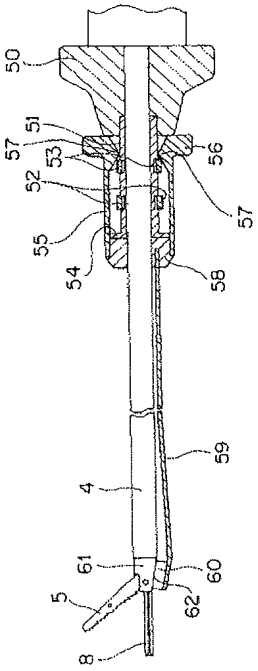

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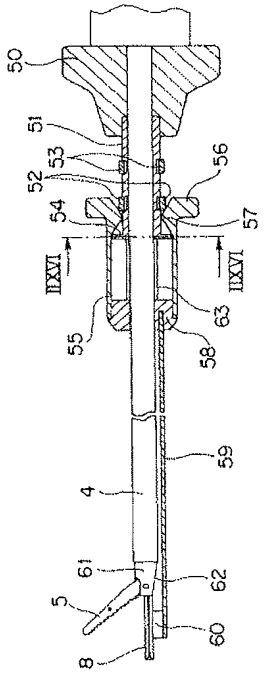

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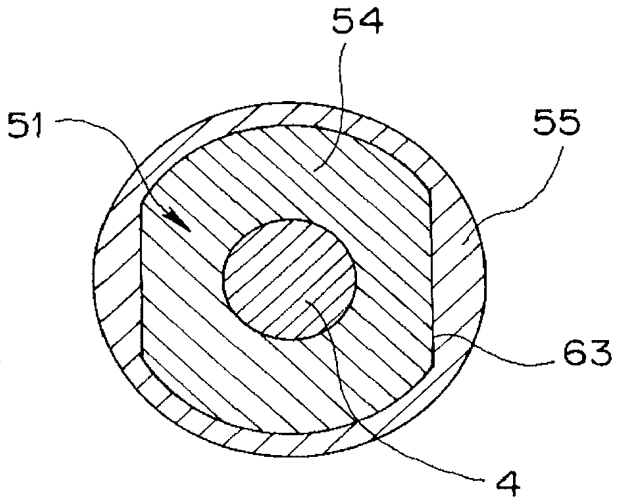

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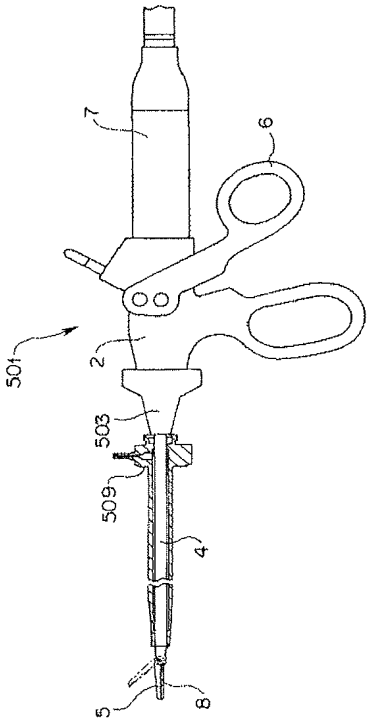

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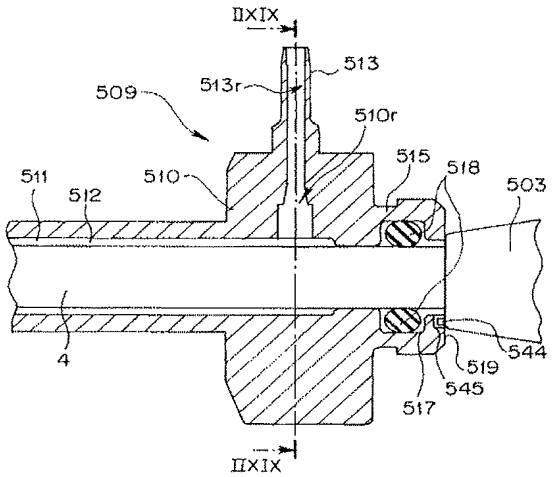

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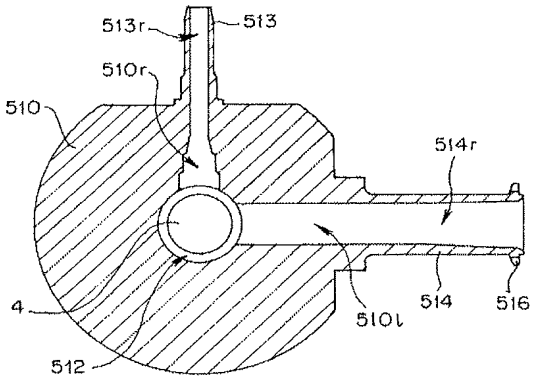

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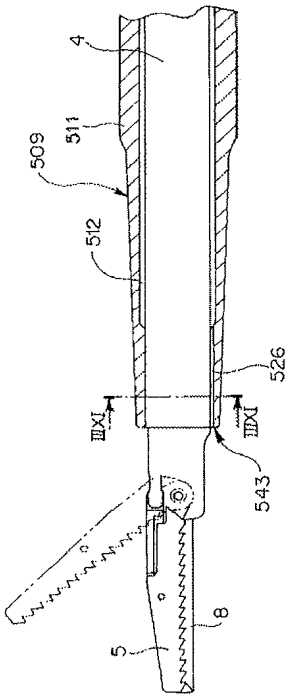

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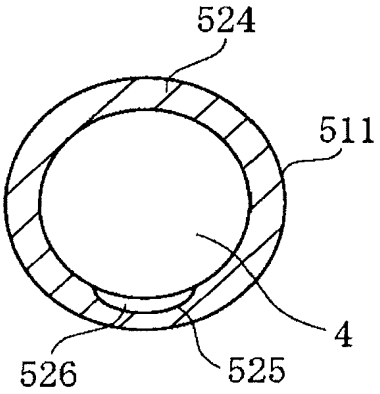

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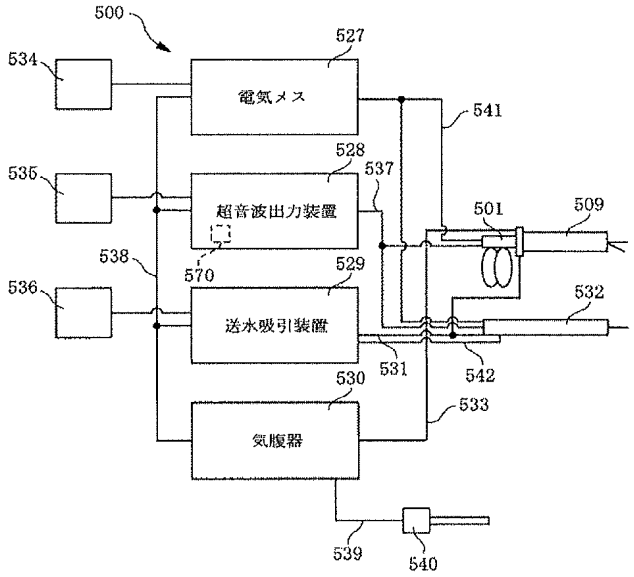

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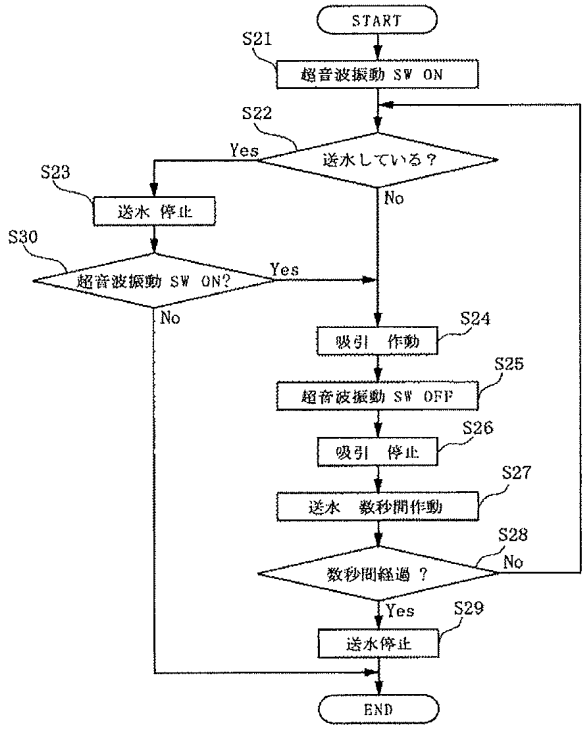

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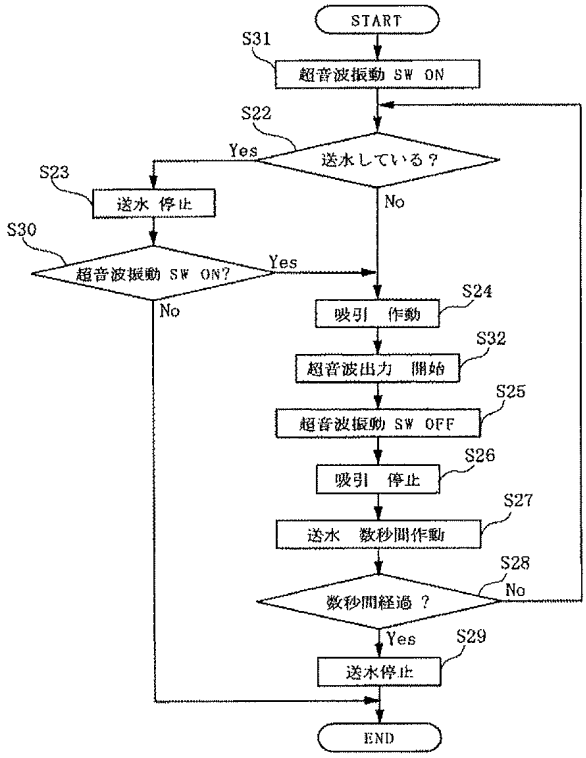

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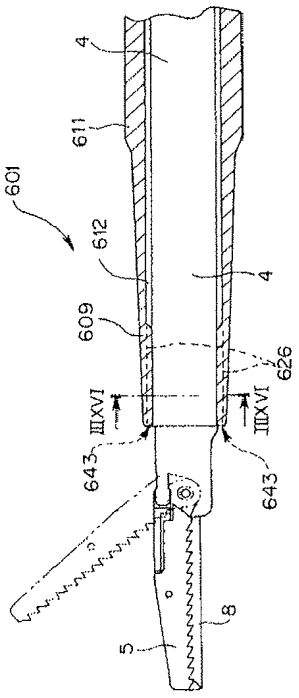

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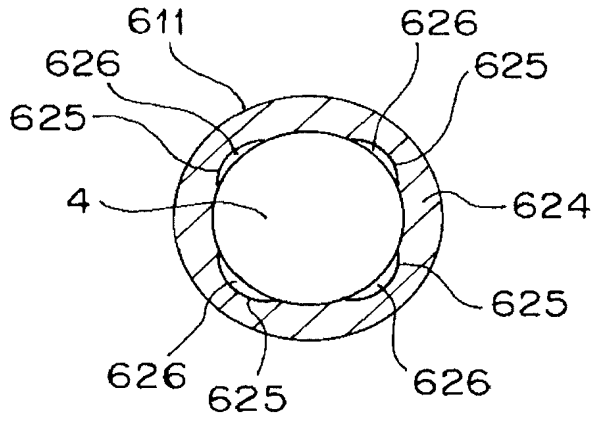

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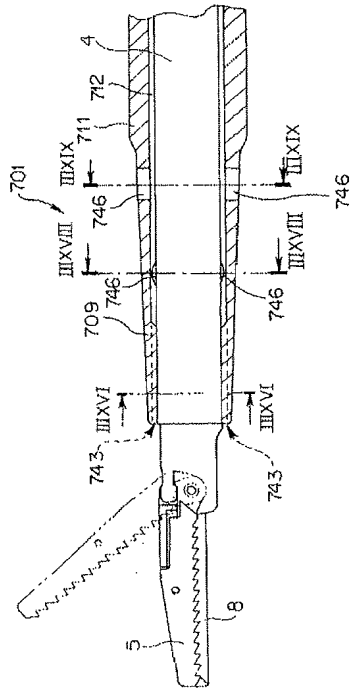

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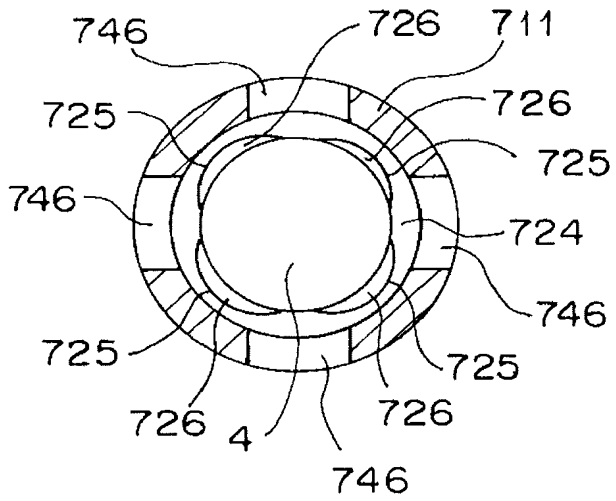

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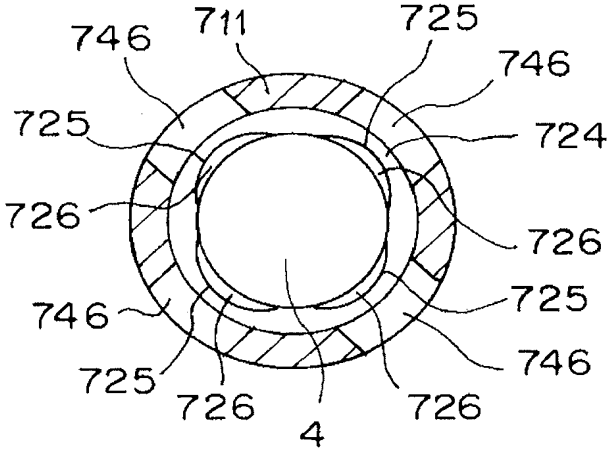

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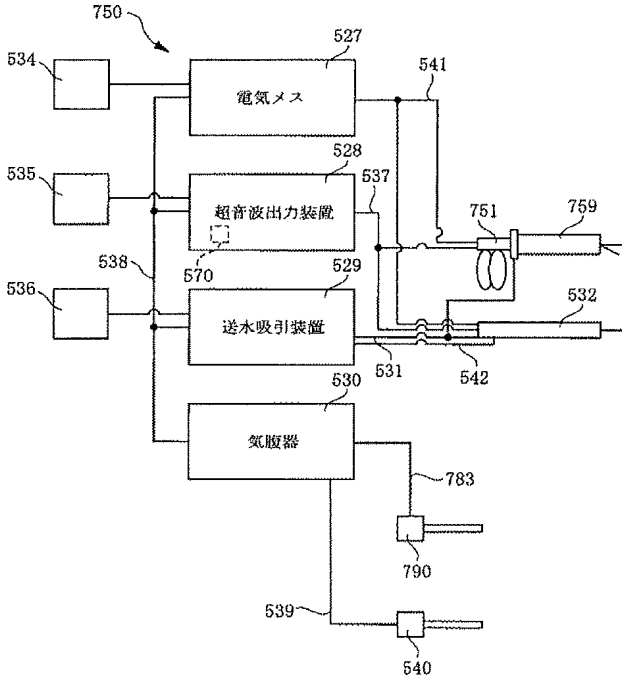

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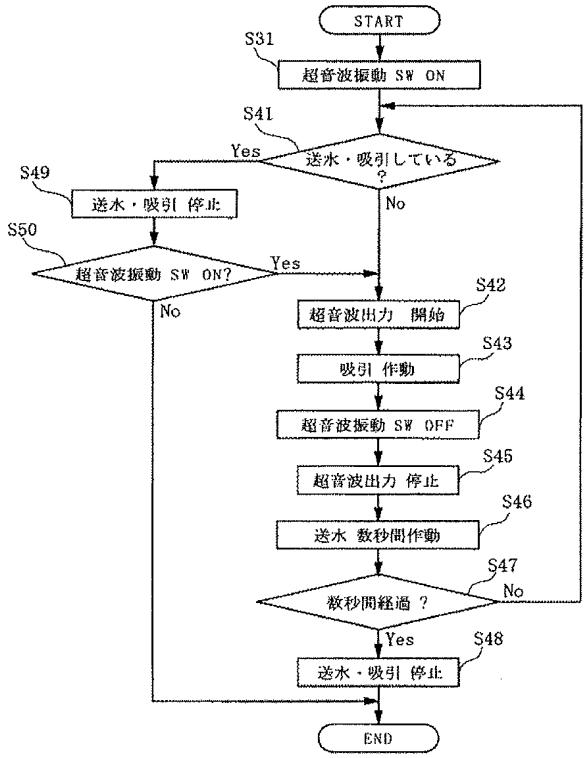

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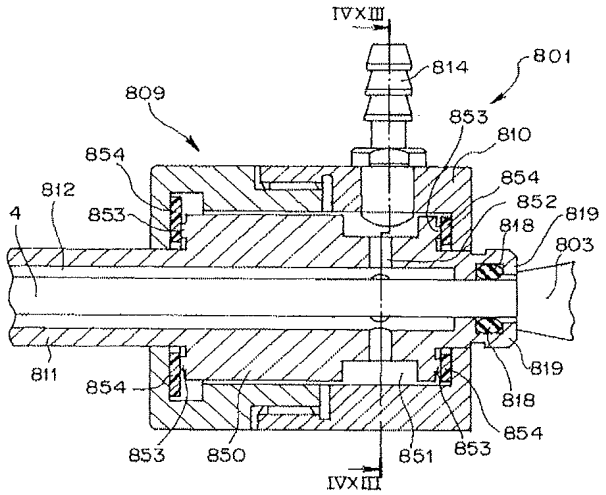

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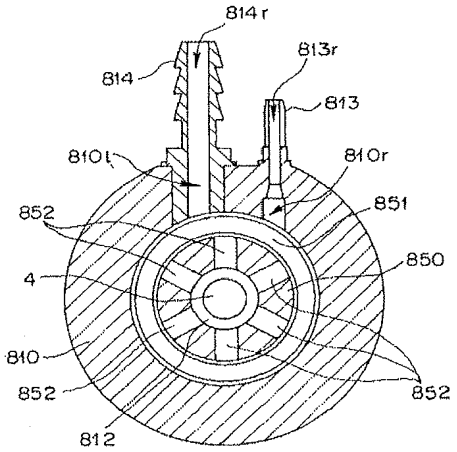

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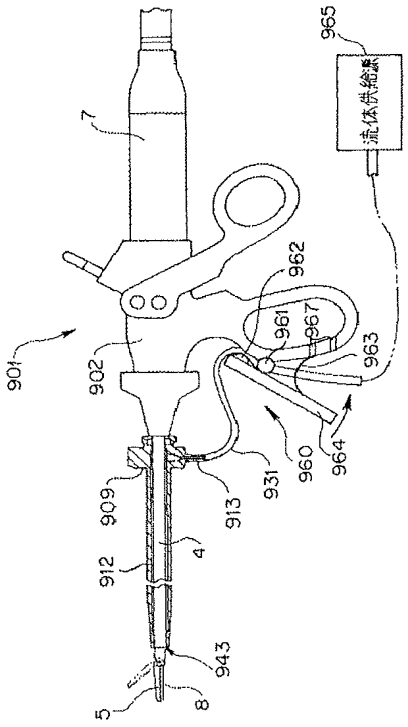

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(33)優先権主張国　日本国 (JP)

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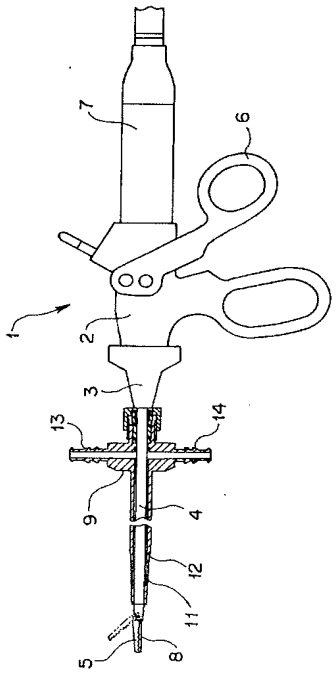
最終頁に続く

(54)【発明の名称】医療用処置具

(57)【要約】
【課題】処置中に発生する煙やミストを効果的に吸引することができるとともに、処置後、発熱した処置部を迅速に冷却できる構成を有することにより、使い勝手を向上した医療用処置具を提供する。
【解決手段】体腔内に挿入される細長の挿入部４と、前記挿入部４の先端に設けられ、前記体腔内の処置対象組織を加熱して処置を行う把持部５，プローブ８と、挿入部４の少なくとも一部が挿通されるシース９と、挿入部４の外周とシース９の内周との間に形成され、把持部５，プローブ８に対し供給する流体と前記体腔内から吸引する流体との少なくとも一方が流れる流路１２と、流路１２に連通する送水送気ポート１３，吸引ポート１４と、流路１２に連通して把持部５，プローブ８に対向して開口された開口部と、を具備することを特徴とする。
【選択図】図１



【特許請求の範囲】
【請求項１】
体腔内に挿入される細長の挿入部と、
前記挿入部の先端に設けられ、前記体腔内の処置対象組織を加熱して処置を行う処置部と、
前記挿入部の少なくとも一部が挿通される筒状部材と、
前記挿入部の外周と前記筒状部材の内周との間に形成され、前記処置部に対し供給する流体と前記体腔内から吸引する流体との少なくとも一方が流れる流路と、
前記流路に連通して、前記処置部に対し供給される流体の前記流路への供給と前記体腔内から吸引される流体の前記流路からの排出との少なくとも一方を行う流出入口と、
前記流路に連通して、前記処置部に対向して開口された開口部と、
を具備することを特徴とする医療用処置具。
【請求項２】
前記筒状部材は、該筒状部材の内周面の径が挿通された前記挿入部の径よりも大径に形成されているとともに、前記筒状部材から、前記挿入部の先端に設けられた前記処置部が突出されていることを特徴とする請求項１に記載の医療用処置具。
【請求項３】
前記開口部の断面積が、前記流路の断面積よりも小さいことを特徴とする請求項１に記載の医療用処置具。
【請求項４】
前記処置部は、前記処置対象組織を加熱する加熱部と該加熱部に対して開閉自在な開閉部とからなり、
前記開口部は、少なくとも前記加熱部に対向して開口していることを特徴とする請求項１または３に記載の医療用処置具。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、体腔内の処置対象組織を加熱し該処置対象組織の処置を行う処置部が、細長の挿入部に設けられた医療用処置具に関する。
【背景技術】
【０００２】
従来、超音波振動を用いて、組織切除や有機物及びその他の堆積物を除去する医療用処置具である超音波処置具が種々提案されている。
例えば特許文献１には、超音波振動を用いて処置対象組織を超音波処置するとともに、該超音波処置に際に発生する体腔内の血液等の粒子（以下、エアロゾルと称す）を吸引することができる超音波処置具が開示されている。
【０００３】
具体的には、特許文献１に開示された超音波処置具は、ハンドピースに、超音波振動子（以下、単に振動子と称す）が設けられており、該振動子が、処置対象組織を超音波処置する処置部が設けられた細長の超音波伝達用プローブ（以下、単にプローブと称す）に連結された構成を有している。このことから、振動子が駆動により発した超音波振動は、プローブを介して処置部に伝達されるようになっている。
【０００４】
また、超音波処置具には、プローブの処置位置に対向する位置（以下、先端側と称す）を、該プローブ先端側の外周との間に環状の開空間を形成するよう周状に覆うシースが設けられている。
【０００５】
シースには、開空間と連通する吸引口が形成されており、該吸引口には、吸引チューブを介して吸引源が接続されている。さらに、超音波処置具には、処置部に対し水を吹き付ける、先端側に開口する水供給源に接続された管路が配設されている。

【０００６】
このように構成された、特許文献１に開示された超音波処置具は、処置部に超音波振動を伝達するとともに水をプローブに吹き付けることにより、キャビテーションによって発生させたエアロゾルまたはミストを用いて処置対象組織を超音波処置する。また、処置中に発生したエアロゾルを、シースに形成された開口部、吸引口及び吸引チューブを介して、吸引源により吸引できるようになっている。
【特許文献１】欧州特許第０６４５９８７号公報
【発明の開示】
【発明が解決しようとする課題】
【０００７】
ところで、超音波処置具を用いて超音波処置を行うに際し、ハンドピースに設けられた振動子は、超音波振動を発する駆動のため発熱する。この発熱により、ハンドピースが熱されて、保持出来なくなることを防止するため、特許文献１に開示された超音波処置具は、超音波処置の際、振動子に水を供給することにより、振動子を冷却する構成となっている。
【０００８】
しかしながら、近年、使用されている超音波処置具においては、プローブと処置対象組織との摩擦熱を利用して凝固や切開の処置を行うため、特許文献１に開示された処置中の水による冷却は、処置能力を低下させてしまい好ましくないといった問題がある。また、駆動中の振動子の冷却に、水の供給が不要となる構成を有するものが主流となってきているといった経緯もある。
【０００９】
このような駆動中の振動子の冷却に、水の供給を必要としない超音波処置具であっても、処置対象組織が本来有する水分により、処置中にキャビテーション等が発生する。また、超音波処置具だけでなく、高周波電流を使用してジュール熱により処置を行う高周波処置具やレーザー光により処置を行うレーザー処置具等を用いた処置においても、処置により煙やミストが発生する。
【００１０】
各種処置具を用いた処置は、処置具とともに、体腔内の処置部位を観察するため、内視鏡も体腔内に挿入するのが一般的であるが、処置中に発生したミストや煙は、内視鏡の視界を妨げるとともに、内視鏡前面のレンズを汚すため術者にとって非常に煩わしいものとなる。
【００１１】
このため、意図的にキャビテーションを発生させない処置具であっても、処置の際、処置中に発生した煙やミスト等を、シースに形成された開口部、及び吸引チューブを介して、吸引源により吸引できるように構成する必要がある。
【００１２】
また、熱を利用して処置対象組織を処置する処置具においては、処置直後は、処置部は、高温となっている。よって、処置具を体腔内から抜去する際等は、高温の処置部を冷却した後行うのが一般的である。
【００１３】
しかしながら、これも通常は、処置部が自然に冷却するのを待ってから抜去を行うため、迅速に作業を行うことができない他、術者にとっては大変煩雑であるといった問題があった。また、このことは、特許文献１に開示された超音波処置具では、何ら考慮がなされていない。
【００１４】
本発明の目的は、上記事情に鑑みてなされたものであり、体腔内の処置対象組織を加熱し該処置対象組織の処置を行う医療用処置具において、処置中に発生する煙やミストを効果的に吸引することができるとともに、処置後、発熱した処置部を迅速に冷却できる構成を有することにより、使い勝手を向上した医療用処置具を提供することにある。

【課題を解決するための手段】
【００１５】
上記目的を達成するために本発明による医療用処置具は、体腔内に挿入される細長の挿入部と、前記挿入部の先端に設けられ、前記体腔内の処置対象組織を加熱して処置を行う処置部と、前記挿入部の少なくとも一部が挿通される筒状部材と、前記挿入部の外周と前記筒状部材の内周との間に形成され、前記処置部に対し供給する流体と前記体腔内から吸引する流体との少なくとも一方が流れる流路と、前記流路に連通して、前記処置部に対し供給される流体の前記流路への供給と前記体腔内から吸引される流体の前記流路からの排出との少なくとも一方を行う流出入口と、前記流路に連通して、前記処置部に対向して開口された開口部と、を具備することを特徴とする。
【発明の効果】
【００１６】
本発明によれば、体腔内の処置対象組織を加熱し該処置対象組織の処置を行う医療用処置具において、処置中に発生する煙やミストを効果的に吸引することができるとともに、処置後、発熱した処置部を迅速に冷却できる構成を有することにより、使い勝手を向上した医療用処置具を提供することができる。
【００１７】
また、超音波処置具や高周波処置具やレーザー処置具等で処置対象組織に処置を行うと、処置対象組織からミストや煙が発生する。これらのミストや煙は、内視鏡を用いた処置においては視野を妨げる原因となり、さらに内視鏡前面のレンズを汚してしまうが、本発明によれば、処置中に発生するミストや煙等を吸引することで、術中の観察視野を確実に確保することができる。
【００１８】
さらに、熱を利用して処置対象組織を処置する処置具においては、処置直後は処置装置の処置部は高温となっている。本発明によれば、処置直後に、処置部に水やガス等の流体を送水または送気することで処置部を冷却するとともに、処置部に付着した汚れを除去することができることから処置後の処置部の汚れを防止することができる。
【発明を実施するための最良の形態】
【００１９】
以下、図面を参照して本発明の実施の形態を説明する。
尚、熱を利用して外科手術等の各種処置を行う医療用処置具には、超音波を利用した超音波処置具、高周波電流によるジュール熱等を利用した高周波処置具、レーザー光を利用したレーザー処置具、電磁波を利用したＲＦ処置具等あるが、本実施の形態においては、凝固切開用の超音波処置具を例に挙げて説明する。
【００２０】
（第１実施の形態）
図１は、本発明の第１実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図、図２は、図１の挿入部の基端部側の拡大断面図、図３は、図２中の接続ネジの外周に把持溝を設けた変形例を示す図である。また、図４は、図１の挿入部の先端側を拡大して示した図、図５は、図４中のＶ－Ｖ線に沿う断面図、図６は、図１の超音波処置具を有する超音波処置装置の構成の概略を示すブロック図である。
【００２１】
尚、以下の説明において、超音波処置具は、体腔内に挿入される側を先端側、操作部側を基端側として説明する。
図１に示すように、超音波処置具１は、体腔内に挿入される細長い挿入部４を有して構成されており、挿入部４の先端側に、処置部である把持部５が配設されている。尚、把持部５は、例えば開閉自在な一対のジョーから構成された開閉部を構成しており、該ジョーにより、体腔内の処置対象組織を把持して加熱し、凝固切開等の処置を行う。尚、把持部５は、後述するプローブ８の先端側に対して開閉自在である。
【００２２】

また、挿入部４の基端側は、操作部である回動ノブ３の先端に接続されている。尚、回動ノブ３は、操作部である固定ハンドル２の先端に接続されており、挿入部４の軸心を回転中心として該挿入部４を軸回り方向に回転操作するものである。

【００２３】

さらに、固定ハンドル２に、把持部５の一対のジョーを開閉操作する可動ハンドル６が、枢支軸を介して回動自在に取り付けられている。また、固定ハンドル２には、挿入部４に挿通された、先端が把持部５に接続され、基端が振動子７に接続された加熱部である細長のプローブ８が取り付けられている。

【００２４】

尚、プローブ８は、後述する電源本体２７（図６参照）から供給された電力により発生する熱を利用して処置対象組織に対し凝固等の各種処置を行うものであることから、プローブ８の先端側である把持部５に接続された部位は、処置部を構成している。

【００２５】

また、挿入部４の外周、具体的には、挿入部４の把持部５及びプローブ８の先端側を除いた外周には、筒状部材である送水吸引シース（以下、単にシースと称す）９が装着されている。即ち、シース９から把持部５及びプローブ８の先端側が突出されている。尚、シース９は、挿入部４の外周の少なくとも一部に対して着脱自在である。即ち、挿入部４の少なくとも一部は、シース９に挿通されている。

【００２６】

図２に示すように、シース９は、例えばフランジ状の本体部１０と、該本体部１０の略中央から先端側に延出した本体部１０より小径な挿入部１１と、本体部１０の略中央から基端側に延出した本体部１０より小径な接続部１３４とを有して主要部が構成されている。尚、接続部１３４の外周には、ネジが形成されている。

【００２７】

挿入部１１の孔の内径は、挿入部４の外径より大径に形成されている。このことにより、挿入部１１の内周と挿入部４の外周との間に流路１２が形成されている。また、本体部１０に、該本体部１０を先端から基端まで連通する孔に略垂直な流路１０ｒ，１０１が形成されている。尚、流路１０ｒ，１０１は、流路１２に連通している。

【００２８】

さらに、本体部１０に、後述する送水、送気用のポンプを持つ送水・送気装置２９（図６参照）と、接続するための流入口である送水送気ポート１３が、挿入部１１と略垂直となるよう設けられている。送水送気ポート１３は、流路１３ｒを有しており、該流路１３ｒは、本体部１０の流路１０ｒと連通している。即ち、流路１３ｒは、流路１２とも連通している。

【００２９】

また、本体部１０に、後述する吸引用のポンプを持つ吸引装置３０（図６参照）と、接続するための流出口である吸引ポート１４が、挿入部１１と略垂直となるよう設けられている。吸引ポート１４は、流路１４ｒを有しており、該流路１４ｒは、本体部１０の流路１０１と連通している。即ち、流路１４ｒは、流路１２とも連通している。

【００３０】

尚、送水送気ポート１３，吸引ポート１４は、超音波処置具１と干渉しない範囲であれば、挿入部１１に対して略垂直に限らず、本体部１０に、取り付け角度を自由にして設けられる。

【００３１】

また、送水送気ポート１３、吸引ポート１４は、把持部５及びプローブ８の先端側からなる処置部に対し供給される流体の流路１２への供給と、体腔内から吸引される流体の流路１２からの排出との少なくとも一方を行う流出入口を構成している。

【００３２】

送水送気ポート１３の外周に、送水送気ポート１３と送水・送気装置２９とを接続するチューブ３２の一端が被覆される。また、吸引ポート１４の外周にも、吸引ポート１４と

吸引装置３０とを接続するチューブ３２の一端が被覆される。

【００３３】

尚、送水送気ポート１３，吸引ポート１４の外周には、被覆されたチューブ３２の抜けを防止するカギ状の凸部１５が設けられている。このことにより、各ポート１３，１４に、チューブ３２の一端を直接接続することができる。

【００３４】

また、送水送気ポート１３，吸引ポート１４の外周の端部に、チューブ３２のそれぞれの一端に接続される、図示しないルアロックコネクタと接続するためのルアロック口金１６がそれぞれ設けられている。このことにより、各ポート１３，１４に、ルアロックコネクタが一端に接続されたチューブ３２を接続することができる。

【００３５】

尚、各ポート１３，１４に、凸部１５とルアロック口金１６とのいずれか一方のみを設けてもよい。また、本体部１０に設けられるポートの数は、２つに限定されず、１つ以上であれば、任意の数を設けることができる。尚、１つのみ設ける場合は、後述する図１８～図２２で詳細に説明する。

【００３６】

本体部１０の接続部１３４の外周に形成されたネジ部に、環状の接続ネジ１７が螺合されている。接続ネジ１７は、挿入部の軸方向（以下挿入軸方向と称す）において、接続ネジ１７の基端部２１と、接続部１３４の底部３４との間に、弾性部材１８とスリーブ１９とを挟み込むように、接続部１３４の外周に取り付けられている。

【００３７】

尚、弾性部材１８及びスリーブ１９は、環状に形成されており、弾性部材１８及びスリーブ１９の各内周は、挿入部４が挿通されるよう、挿入部４の外径よりも大きく形成されている。

【００３８】

さらに、接続ネジ１７の基端部２１に形成された開口の内周も、挿入部４が挿通されるよう、挿入部４の外径よりも大きく形成されている。尚、基端部２１に形成された開口の内周は、回動ノブ３の先端側の径より小さく形成されている。

【００３９】

また、接続ネジ１７の外周に、図３に示すように、接続部１３４に対して取り付け易いよう、把持溝２０を形成してもよい。

【００４０】

このように構成された接続ネジ１７、弾性部材１８、スリーブ１９を、本体部１０の接続部１３４に取り付けるには、先ず、スリーブ１９の先端側に弾性部材１８の基端側を差し込み、該弾性部材１８の基端部を、スリーブ１９の基端に形成されたフランジ２２に突き当てる。

【００４１】

次いで、弾性部材１８とスリーブ１９とを組み合わせた状態で、弾性部材１８の先端側を、本体部１０の接続部１３４の内周に嵌合させ、最後に、接続ネジ１７の基端部２１で、弾性部材１８とスリーブ１９とを挿入軸方向に押し潰すように、接続ネジ１７を、接続部１３４の外周に螺合させる。

【００４２】

尚、この際、弾性部材１８とスリーブ１９とを組み合わせた長さは、接続部１３４の基端部の孔の長さと、接続ネジ１７の孔の長さを足したものより短くなっている。

【００４３】

図４に示すように、挿入部４に、シース９を装着したときのシース９の先端は、把持部５及びプローブ８の先端側が露出されるよう、把持部５よりも基端側に位置する。また、シース９の挿入部１１の先端は、テーパ状に形成されている。

【００４４】

図５に示すように、挿入部１１の先端部の内周に、挿入部４の外周と当接する、例えば

４つの凸状の支持部２４が形成されており、また、挿入部１１の先端部の内周に、４つの支持部２４を、挿入部１１の先端部の内周に沿って連結する４つの円弧２５が形成されている。

【００４５】

４つの支持部２４で区切られた、４つの円弧２５と挿入部４の外周との間には、先端流路２６が形成されており、該先端流路２６は、挿入部１１の内周と挿入部４の外周との間に形成された流路１２と連通している。

【００４６】

また、先端流路２６は、挿入部４に、シース９を装着したときのシース９の先端が、把持部５よりも基端側に位置することにより、把持部５またはプローブ８に対向する位置の近傍である、把持部５の基端側において開口部３５として開口されている。尚、開口部３５は、把持部５よりプローブ８の先端側の近傍位置に設けられている。即ち、開口部３５は、少なくともプローブ８の先端側に対して開口されている。

【００４７】

図６に示すように、超音波処置装置１００は、超音波処置具１と、電源本体２７と、スイッチ２８と、供給源である送水・送気装置２９と、吸引源である吸引装置３０とを有して主要部が構成されている。

【００４８】

超音波処置具１の振動子７は、超音波駆動を行う電源本体２７と接続されている。また、電源本体２７に、振動子７を発振させるためのスイッチ２８が接続されている。

【００４９】

電源本体２７と送水・送気装置２９と吸引装置３０とは、連動して作動できるようケーブル３１により電気的に接続されている。さらに、送水・送気装置２９は、超音波処置具１の送水送気ポート１３とチューブ３２により接続されており、吸引装置３０は、超音波処置具１の吸引ポート１４とチューブ３２により接続されている。

【００５０】

ここで、一方、送水・送気装置２９より流体が送気、送水された場合は、流体は、送水・送気装置２９と接続されたチューブ３２を介して、送水送気ポート１３の流路１３ｒに進入した後、流路１０ｒ，シース９の挿入部１１の内周と挿入部４の外周との間の流路１２を通過して、先端流路２６の先端開口部３５から、把持部５及びプローブ８の先端側に送水・送気される。

【００５１】

他方、先端開口部３５から、吸引装置３０により煙、ミスト等の流体が吸引された場合は、流体は、先端開口部３５から先端流路２６に進入した後、流路１２，１０１，１４ｒを通過して、吸引ポート１４に接続されたチューブ３２を介して、吸引装置３０より排出される。

【００５２】

次に、このように構成された本実施の形態の超音波処置具１の作用について図１～図６、及び図７～図９を用いて説明する。

図７は、図１の超音波処置具１の挿入部４からシース９を脱却した分解図、図８は、図１の超音波処置具を用いて、体腔内の処置対象組織の処置を行う際の超音波処置装置の制御方法を示したフローチャート、図９は、図１のシースの挿入部の先端側を把持部の先端側を覆う位置に移動させた状態を示す図である。

【００５３】

先ず、図７に示すように、シース９を、超音波処置具１の挿入部４に、該挿入部４の先端側に対し、シース９の基端部側から回動ノブ３に突き当たるまで挿入した後、図２に示すように、接続ネジ１７を、該接続ネジ１７の基端部２１で、弾性部材１８とスリーブ１９とを挿入軸方向に押し潰すように、接続ネジ１７を、接続部１３４の外周に螺合させる。

【００５４】

その結果、弾性部材１８の内径が小さくなり、弾性部材１８の内周は、挿入部４の外周と密着する。このことにより、シース９は、超音波処置具１に固定される。尚、この際、上述したように、挿入部４の外周とシース９の挿入部１１の内周との間に、流路１２が形成される。流路１２は、先端流路２６と、本体部１０の流路１０ｒ，１０１と、送水送気ポート１３の流路１３ｒと、吸引ポート１４の流路１４ｒと連通している。

【００５５】

その後、送水送気ポート１３と送水・送気装置２９とをチューブ３２で接続し、さらに、吸引ポート１４と吸引装置３０とをチューブ３２で接続した後、超音波処置具１の挿入部４を体腔内に挿入して、体腔内の処置対象組織の処置を行う。

【００５６】

尚、以下の動作は、超音波処置装置１００の電源本体２７内に配設された制御部である制御手段７０から、送水・送気装置２９及び吸引装置３０へ、図示しない通信線を介して制御信号が送られることによって行われる。即ち、制御手段７０の動作制御により行われる。

【００５７】

体腔内の処置対象組織の処置を行う際は、先ず、把持部５により、処置対象となる処置対象組織が把持された後、図８に示すように、ステップＳ１において、超音波振動スイッチ（ＳＷ）となるスイッチ２８（図６参照）がオン操作されることにより、電源本体２７からの電力の供給を受け、振動子７は超音波駆動を行う。振動子７の振動は、プローブ８を介して把持部５に伝達される。このことにより、処置対象組織は、先端側のプローブ８の振動による処置対象組織との摩擦により加熱され、凝固切開等の処置が行われる。

【００５８】

次いで、ステップＳ２において、送水・送気装置２９の作動により、開口部３５から、把持部５またはプローブ８に対して、流体が送水または送気されているか否かを判定される。

【００５９】

一方、開口部３５から流体が送水または送気されている場合は、ステップＳ３に分岐し、送水・送気装置２９を停止させることにより、開口部３５からの流体の送水または送気を停止させ、ステップＳ１０でスイッチ２８がオンであることが再度確認された後、ステップＳ４に移行する。他方、開口部３５から流体が送水または送気されてない場合は、ステップＳ４に移行する。

【００６０】

ステップＳ４では、把持部５により処置対象組織が加熱処置されると連動して、吸引装置３０が作動されることにより、処置の際に発生したミストや煙の吸引が行われる。具体的には、先端開口部３５から、吸引装置３０により吸引された流体は、先端開口部３５から先端流路２６に進入した後、流路１２，１０１，１４ｒを流れて、吸引ポート１４に接続されたチューブ３２を介して、吸引装置３０より排出される。

【００６１】

尚、この際、図９に示すように、シース９は、弾性部材１８に接続されているため、挿入部４に対してスライド可能であることから、シース９の挿入部１１を、先端側にスライドさせ把持部５を覆った後、先端開口部３５を、把持部５より先端側へ押し出すことにより、挿入部４の先端より流体を吸引してもよい。

【００６２】

把持部５による処置対象組織の処置が終了すると、ステップＳ５において、スイッチ２８（図６参照）がオフ操作されることにより、電源本体２７からの電力の供給が遮断され、振動子７が停止する。

【００６３】

次いで、振動子７の停止と連動して、ステップＳ６では、吸引装置３０が停止されることにより、処置の際に発生したミストや煙の吸引が停止される。その後、ステップＳ７に移行する。

【００６４】
ステップＳ７では、送水・送気装置２９が、あらかじめ設定された時間である数秒間だけ作動されることにより、把持部５またはプローブ８に対して、先端開口部３５から流体が、送水または送気される。
【００６５】
具体的には、送水・送気装置２９から供給された流体は、チューブ３２を介して、送水送気ポート１３の流路１３ｒに進入した後、シース９の挿入部１１の内周と挿入部４の外周との間の流路１２を流れて、先端流路２６の先端開口部３５から、把持部５またはプローブ８に送水・送気される。このことにより、処置により熱された把持部５またはプローブ８は冷却される。また、処置により付着した把持部５の汚れを、流体の送水または送気により除去することができる。
【００６６】
次いで、ステップＳ８では、先端開口部３５から、流体が送水または送気された時間が、あらかじめ設定された数秒間を経過したか否かが判定される。あらかじめ設定された数秒間が経過してなければ、ステップＳ２に戻り、ステップＳ３において、流体の送気または送水時間が数秒間経過後、送水・送気装置２９が停止され、続くステップＳ１０において、スイッチ２８のオフが確認された後、ルーチンを終了する。
【００６７】
ステップＳ８に戻って、先端開口部３５から、流体が送水または送気された時間が、あらかじめ設定された数秒間を経過しておれば、ステップＳ９に移行し、最後に、ステップＳ９では、送水・送気装置２９を停止させることにより、先端開口部３５からの流体の送水または送気が停止され、その後ルーチンが終了する。
【００６８】
このように、本実施の形態の超音波処置具１においては、超音波処置具１に、流体を送水または送気するための流路１０ｒ，１２，１３ｒ，２６を設けるとともに、処置の際、体腔内から流体を吸引する流路１０ｌ，１２，１４ｒ，２６を設けた。即ち挿入部４と挿入部１１との間に設けられた流路１２は、流体を送水または送気するための流路であるとともに、体腔内から流体を吸引する流路を兼ねていると示した。
【００６９】
また、流路１０ｒ，１０ｌ，１２，１３ｒ，１４ｒ，２６の開口部３５を、把持部５及びプローブ８の近傍に対向して位置するよう、例えば超音波処置具１の先端側に設けた。
【００７０】
このことにより、超音波処置の際に発生する煙やミストを、吸引装置３０により、流路１０ｌ，１２，１４ｒ，２６を介して効果的に吸引することができるので、術者の視野を常に確保したまま、処置具を用いた処置を確実に行うことができる。
【００７１】
また、超音波処置直後、摩擦熱により高温となった把持部５及びプローブ８に、送水・送気装置２９により、流路１０ｒ，１２，１３ｒ，２６を介して開口部３５から流体を送水または送気することができるため、処置後、発熱した把持部５またはプローブ８を迅速に冷却できる。
【００７２】
さらに、挿入部４に流体を送水または送気するための流路と、体腔内から流体を吸引する流路との、２つの流路を設ける必要がなくなる。
【００７３】
以上のことから、術者にとって、使い勝手を向上した超音波処置具を提供することができる。
【００７４】
尚、以下、変形例を示す。
本実施の形態においては、開口部３５から送水または送気される流体は、処置後の把持部５及びプローブ８を冷却するために用いられると示した。これに限らず、流体は、体腔

内に送気または送水されることにより、体腔内の洗滌に用いられてもよい。

【００７５】

このことによれば、超音波処置具１の別ポートからの送水吸引管の挿入を省略することができる他、超音波処置具を体腔内から抜去した後、送水吸引管のみを挿入する手間を省略することができる。

【００７６】

（第２実施の形態）

図１０は、本発明の第２実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図、図１１は、図１０の挿入部の基端部側の拡大断面図、図１２は、図１０の挿入部の先端部側の拡大断面図である。

【００７７】

本実施の形態の超音波処置具の構成は、上記図１～図９に示した第１実施の形態の超音波処置具１と比して、送水送気ポート１３と吸引ポート１４とを、シース９の本体部１０に設けずに、回動ノブに設ける点が異なる。よって、この相違点のみを説明し、第１実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【００７８】

図１０に示すように、超音波処置具２０１は、体腔内に挿入される細長い挿入部４を有して構成されており、挿入部４の先端側に、処置部である把持部５が配設されている。また、挿入部４の少なくとも一部、例えば基端側は、操作部の筒状部材である回動ノブ３７に被覆されている。その結果、回動ノブ３７から把持部５及びプローブ８の先端側が突出されている。尚、回動ノブ３７は、挿入部４の軸心を回転中心として該挿入部４を軸回り方向に回転操作するものであり、機能は、第１の実施の形態の回動ノブ３と略同一のものである。

【００７９】

また、挿入部４の基端側の外周と、回動ノブ３７の内周との間に、流路である空間３８が形成されている。即ち、挿入部４の基端側は、回動ノブ３７の内周の空間３８に挿通されている。また、回動ノブ３７は、操作部の固定ハンドル２の先端に接続されている。

【００８０】

さらに、固定ハンドル２に、把持部５の一対のジョーを開閉操作する可動ハンドル６が、枢支軸を介して回動自在に取り付けられている。また、固定ハンドル２には、挿入部４内の管路プローブチャンネル４６に挿通された、先端が把持部５に接続され、基端が振動子７に接続された細長のプローブ８が取り付けられている。

【００８１】

また、図１１に示すように、挿入部４の内部であって、挿入部４の内周と、管路プローブチャンネル４６の外周との間に、例えば可動ハンドル６の操作を把持部５に伝達する、可動ハンドル６と把持部５とを接続する駆動軸３９が挿通される駆動軸チャンネル４０が配設されている。尚、駆動軸チャンネル４０は、流路も構成している。

【００８２】

尚、駆動軸チャンネル４０の先端側は、図１２に示すように、挿入部４の先端側において、例えば把持部５に対向する位置において開口部４１として開口されている。また、駆動軸チャンネル４０は、回動ノブ３７の空間３８と挿通している。尚、開口部４１は、把持部５よりプローブ８の先端側の近傍位置に設けられている。即ち、開口部４１は、少なくともプローブ８の先端側に対して開口されている。

【００８３】

さらに、回動ノブ３７に、送水送気ポート１３が設けられている。送水送気ポート１３は、流路１３ｒを有しており、該流路１３ｒは、回動ノブ３７の空間３８と連通している。即ち、流路１３ｒは、駆動軸チャンネル４０とも連通している。尚、送水送気ポート１３は、上述した第１実施の形態同様、送水・送気装置２９とチューブ３２を介して接続されている。

【００８４】

また、回動ノブ３７に、吸引ポート１４が設けられている。吸引ポート１４は、流路１４ｒを有しており、該流路１４ｒは、回動ノブ３７の空間３８と連通している。即ち、流路１４ｒは、駆動軸チャンネル４０とも連通している。尚、吸引ポート１４は、上述した第１実施の形態同様、吸引装置３０とチューブ３２を介して接続されている。

【００８５】

また、挿入部４内におけるプローブ８の中途位置に、外周面が、管路プローブチャンネル４６の内周に密着するゴムライニング４４がプローブ８を覆うように設けられている。さらに、固定ハンドル２の内周に配設された部材と、固定ハンドル２内に挿通されたプローブ８との間にも、先端リング６８，ゴムライニング６９が配設されている。

【００８６】

尚、このように構成された超音波処置具２０１が配設される超音波処置装置の構成は、図６に示した第１実施の超音波処置装置の構成と同一であるため、その説明は省略する。

【００８７】

次に、このように構成された本実施の形態の超音波処置具２０１の作用について説明する。尚、以下、処置の際の超音波処置装置１００の制御動作は、図８に示した第１実施の形態の制御動作と同様であるため、その説明は省略する。よって、以下、流体を送水または送気する際、及び流体を吸引する際の超音波処置具２０１の流路における流体の流れのみを本実施の形態の作用として説明する。

【００８８】

先ず、送水送気ポート１３と送水・送気装置２９とを、チューブ３２で接続し、さらに、吸引ポート１４と吸引装置３０とを、チューブ３２で接続した後、超音波処置具２０１の挿入部４を体腔内に挿入して、体腔内の処置対象組織の処置を行う。

【００８９】

その後、一方、処置の際に発生するミスト等の流体を吸引する際は、開口部４１から、吸引装置３０により吸引された流体は、駆動軸チャンネル４０に進入した後、流路３８，１４ｒを流れて、吸引ポート１４に接続されたチューブ３２を介して、吸引装置３０より排出される。

【００９０】

この際、回動ノブ３７内に入り込んだ流体は、プローブ８に設けられたゴムライニング４４があるため、管路プローブチャンネル４６に流入しない構成となっている。また固定ハンドル２の内周にも、先端リング６８とゴムライニング６９とが設けられているため、吸引した流体は流入しない構成となっている。

【００９１】

他方、送水・送気装置２９から供給された流体は、チューブ３２を介して、送水送気ポート１３の流路１３ｒに進入した後、空間３８、駆動軸チャンネル４０を流れて、先端開口部４１から、把持部５及びプローブ８に送水・送気される。

【００９２】

このように、本実施の形態を示す超音波処置具２０１においては、送水送気ポート１３及び吸引ポート１４を、回動ノブ３７に設けた。また、挿入部４内に配設された駆動軸３９が挿通される駆動軸チャンネル４０を、流体を送水または送気する際の、流体を吸引する際の流路として用いた。即ち駆動軸チャンネル４０は、流体を送水または送気するための流路であるとともに、体腔内から流体を吸引する流路を兼ねていると示した。

【００９３】

このことにより、シース９を用いなくとも、超音波処置具２０１に流体が流れる流路を形成することができるため、上述した第１実施の形態に比べ、製造コストを削減することができる。

【００９４】

また、回動ノブ３７を回動させる際、送水送気ポート１３及び吸引ポート１４を、回動ノブの回動に対して接触しない位置に移動させることができる。

【００９５】

尚、その他の効果は、上述した第１実施の形態の超音波処置具と同一である。

【００９６】

（第３実施の形態）

図１３は、本発明の第３実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図、図１４は、図１３中のＸＩＶ－ＸＩＶ線に沿う断面図、図１５は、図１３の挿入部の基端部側の拡大断面図、図１６は、図１３の挿入部の先端部側の拡大断面図、図１７は、図１６中のＸＶＩＩ－ＸＶＩＩ線に沿う断面図である。

【００９７】

本実施の形態の超音波処置具の構成は、上記図１０～図１２に示した第２実施の形態の超音波処置具１と比して、回動ノブを挿入軸の先端側に延長し、該延長した部位に、送水送気ポート１３及び吸引ポート１４を設けた点が異なる。よって、この相違点のみを説明し、第２実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【００９８】

図１３に示すように、超音波処置具３０１は、体腔内に挿入される細長い挿入部４を有して構成されており、挿入部４の先端側に、処置部である把持部５が配設されている。また、挿入部４の少なくとも一部、例えば基端側は、操作部の筒状部材である回動ノブ４２によって被覆されている。即ち、回動ノブ４２から把持部５及びプローブ８の先端側が突出されている。

【００９９】

尚、回動ノブ４２は、挿入部４の軸心を回転中心として該挿入部４を軸回り方向に回転操作するものであり、機能は、第２の実施の形態の回動ノブ３７と略同一のものであるが、第２実施の形態の回動ノブ３７より、挿入部４の先端方向に延長されて形成さている。また、回動ノブ４２は、操作部の固定ハンドル２の先端に接続されている。

【０１００】

さらに、固定ハンドル２に、把持部５の一対のジョーを開閉操作する可動ハンドル６が、枢支軸を介して回動自在に取り付けられている。また、固定ハンドル２には、挿入部４内の管路プローブチャンネル４６に挿通された、先端が把持部５に接続され、基端が振動子７に接続された細長のプローブ８が取り付けられている。尚、管路プローブチャンネル４６の内周とプローブ８の外周との間に、図１５に示すように、流路３１２が形成されている。

【０１０１】

また、挿入部４内におけるプローブ８の基端側の位置に、外周面が、管路プローブチャンネル４６の内周に密着する断面形状で、例えば円形のゴムライニング４４が設けられている。

【０１０２】

さらに、挿入部４内におけるプローブ８の先端側の位置に、外周面が、管路プローブチャンネル４６の内周に密着する断面形状で、例えば楕円形のゴムライニング４５が設けられている。

【０１０３】

詳しくは、図１７に示すように、管路プローブチャンネル４６内であって、プローブ８の外周に、２つの当接部４５ｔが管路プローブチャンネル４６の内周と当接する、ゴムライニング４５が被覆されている。

【０１０４】

２つの当接部４５ｔが区切られた、ゴムライニング４５と管路プローブチャンネル４６の内周との間には、先端流路４７が形成されている。尚、先端流路４７は、流路３１２と連通しており、図１６に示すように、挿入部４の先端側において、例えば把持部５に対向する位置において開口部４８として開口されている。尚、開口部４８は、把持部５よりプローブ８の先端側の近傍位置に設けられている。即ち、開口部４８は、少なくともプローブ８の先端側に対して開口されている。

【０１０５】

尚、ゴムライニング４５は、該ゴムライニング４５と管路プローブチャンネル４６の内周との間に、先端流路４７が形成されるのであれば、楕円形に限定されない。

【０１０６】

回動ノブ４２の挿入軸先端側に延長された部位に、送水送気ポート１３が、図１４に示すように、挿入部４に設けられた孔４３に嵌合されて設けられている。尚、この際、送水送気ポート１３は、回動ノブ４２の挿入軸先端側に延長された部位に、挿入部４とは略垂直に、駆動軸チャンネル４０と干渉しないように設けられている。

【０１０７】

送水送気ポート１３は、流路１３ｒを有しており、該流路１３ｒは、流路３１２と連通している。即ち流路１３ｒは、先端流路４７とも連通している。尚、送水送気ポート１３は、上述した第１，２実施の形態同様、送水・送気装置２９とチューブ３２を介して接続されている。

【０１０８】

また、回動ノブ４２の挿入軸先端側に延長された部位に、吸引ポート１４が、図１４に示すように、挿入部４に設けられた孔４３に嵌合されて設けられている。尚、吸引ポート１４は、回動ノブ４２の挿入軸先端側に延長された部位に、挿入部４とは略垂直に、駆動軸チャンネル４０と干渉しないように設けられている。

【０１０９】

吸引ポート１４は、流路１４ｒを有しており、該流路１４ｒは、流路３１２と連通している。即ち流路１４ｒは、先端流路４７とも連通している。尚、吸引ポート１４は、上述した第１，２実施の形態同様、吸引装置３０とチューブ３２を介して接続されている。

【０１１０】

尚、このように構成された超音波処置具３０１が配設される超音波処置装置の構成は、図６に示した第１実施の超音波処置装置の構成と同一であるため、その説明は省略する。

【０１１１】

次に、このように構成された本実施の形態の超音波処置具３０１の作用について説明する。尚、以下、処置の際の超音波処置装置１００の制御動作は、図８に示した第１実施の形態の制御動作と同様であるため、その説明は省略する。よって、以下、流体を送水または送気する際、流体を吸引する際の超音波処置具３０１の流路における流体の流れのみを本実施の形態の作用として説明する。

【０１１２】

先ず、送水送気ポート１３と送水・送気装置２９とを、チューブ３２で接続し、さらに、吸引ポート１４と吸引装置３０とを、チューブ３２で接続した後、超音波処置具３０１の挿入部４を体腔内に挿入して、体腔内の処置対象組織の処置を行う。

【０１１３】

その後、一方、処置の際に発生するミスト等の流体を吸引する際は、開口部４８から、吸引装置３０により吸引された流体は、先端流路４７に進入した後、流路３１２，１４ｒを流れて、吸引ポート１４に接続されたチューブ３２を介して、吸引装置３０より排出される。

【０１１４】

このとき、管路プローブチャンネル４６内に入り込んだ流体は、ゴムライニング４４により固定ハンドル２内に流入しない構成となっている。

【０１１５】

他方、送水・送気装置２９から供給された流体は、チューブ３２を介して、送水送気ポート１３の流路１３ｒに進入した後、流路３１２，先端流路４７を流れて、開口部４８から、把持部５またはプローブ８に送水・送気される。

【０１１６】

このように、本実施の形態を示す超音波処置具３０１を構成しても、上述した第２実施の形態の超音波処置具２０１と同様の効果を得ることができる。

【０１１７】

尚、以下、変形例を示す。

図１８は、図１、図１０、図１３の超音波処置具のプローブの把持部に対向する位置に溝を設けた変形例を示す部分断面図である。

【０１１８】

図１８に示すように、把持部５に接続されたプローブ８の先端部であって、接続面の裏面８ｒに、例えば５個の溝４９を形成しても良い。このように、把持部５に接続されるプローブ８の裏面８ｒに、５個の溝４９を形成することにより、プローブ８の裏面８ｒの表面積が溝４９により大きくなることから、処置後、プローブ８に溜まった熱が放熱しやすくなり、流体をプローブ８に送水または送気する他、プローブ８の温度を下げることができる。

【０１１９】

また、この場合であっても、プローブ８に対する流体の送水または送気を行ってもよい。さらに、溝４９の数は、５個に限定されず、溝４９は、把持部５と噛み合う面以外ならいくつ形成しても良い。また溝４９の形状や方向は、任意に設定することができる。

【０１２０】

尚、以下、さらに別の変形例を示す。

図１９は、図１の超音波処置具に、送水送気ポートと吸引ポートとを共通化したポートを１つ設けた変形例を示す部分断面図、図２０は、図１９の挿入部の基端部側の拡大断面図、図２１は、図１９の超音波処置具を有する超音波処置装置の構成の概略を示すブロック図、図２２は、図２１の超音波処置装置のさらに別の構成の概略を示すブロック図である。

【０１２１】

上述した第１実施の形態の超音波処置具１においては、本体部１０に、送水送気ポート１３及び吸引ポート１４の２つのポートが設けられていると示した。これに限らず、本体部１０に、送水送気ポート１３と吸引ポート１４とを共用化したポート３２３を１つだけ設けても良い。即ちポート３２３は、流入口と流出口とを構成する。

【０１２２】

具体的には、図１９に示すように、本体部１０に、送水・送気装置２９（図２１参照）及び吸引装置３０（図２１参照）と、接続するための共用ポート３２３が設けられている。図２０に示すように、共用ポート３２３は、流路３２３ｒを有しており、該流路３２３ｒは、本体部１０の流路１０ｒ（１０１）と連通している。即ち、流路３２３ｒは、流路１２とも連通している。

【０１２３】

尚、共用ポート３２３は、把持部５及びプローブ８の先端側からなる処置部に対し供給される流体の流路１２への供給と、体腔内から吸引される流体の流路１２からの排出との少なくとも一方を行う流出入口を構成している。

【０１２４】

また、図２１に示すように、共用ポート３２３と、送水・送気装置２９及び吸引装置３０とは、切換弁６４が中途位置に設けられたチューブ３２により接続されている。この際、共用ポート３２３の外周に、チューブ３２の一端が被覆される。切換弁６４は、送水・送気装置２９からの流体の送水または送気動作と、吸引装置３０による流体の吸引動作を一方に切り換えるものである。

【０１２５】

尚、共用ポート３２３と、送水・送気装置２９及び吸引装置３０とのチューブ３２による接続は、図２２に示すように、共用ポート３２３に対して、送水・送気装置２９と吸引装置３０とを別々に接続しても良い。この場合、切換弁６４を用いるよりも、簡単な機構で安価に超音波処置装置１００を構成することができる。

【０１２６】

ここで、一方、送水・送気装置２９より流体が送気、送水された場合は、流体は、切換弁６４により、送水・送気装置２９と接続されたチューブ３２を介して、共用ポート３２

３の流路３２３ｒに進入した後、流路１０ｒ（１０１），１２を通過して、先端流路２６（図５参照）の先端開口部３５（図４参照）から、把持部５またはプローブ８に送水・送気される。

【０１２７】

他方、先端開口部３５から、吸引装置３０により流体が吸引された場合は、流体は、切換弁６４により、先端開口部３５から先端流路２６に進入した後、流路１２，１０ｒ（１０１）を通過して、共用ポート３２３に接続されたチューブ３２を介して、吸引装置３０より排出される。

【０１２８】

このように、超音波処置具に、送水または送気用の及び吸引用のポートを１つだけ設けても上述した第１実施の形態と同様の効果を得ることができる。尚、このような構成は、上述した第２実施の形態の超音波処置具２０１、第３実施の形態の超音波処置具３０１に適用してもよい。

【０１２９】

（第４実施の形態）

図２３は、本発明の第４実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図、図２４は、図２３の挿入部の先端部側を拡大して示した図、図２５は、図２４のスライダ部材を挿入軸方向先端に移動させた状態を示す図、図２６は、図２５中のＩＩＸＶＩ－ＩＩＸＶＩ線に沿う断面図である。

【０１３０】

本実施の形態の超音波処置具の構成は、上記図１～図９に示した第１実施の形態の超音波処置具１、上記図１０～図１２に示した第２実施の形態の超音波処置具２０１、上記図１３～図１７に示した第３実施の形態の超音波処置具３０１と比して、把持部５及びプローブ８を冷却するに際し、流体を用いない点が異なる。よって、この相違点のみを説明し、第１～第３実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【０１３１】

図２３に示すように、超音波処置具４０１は、体腔内に挿入される細長い挿入部４を有して構成されており、挿入部４の先端側に、処置部である把持部５が配設されている。また、挿入部４の基端側は、操作部の回動ノブ５０に被覆されている。

【０１３２】

尚、回動ノブ５０は、挿入部４の軸心を回転中心として該挿入部４を軸回り方向に回転操作するものであり、機能は、第１の実施の形態の回動ノブ３と略同一のものである。また、回動ノブ５０は、操作部の固定ハンドル２の先端に接続されている。

【０１３３】

さらに、固定ハンドル２に、把持部５の一対のジョーを開閉操作する可動ハンドル６が、枢支軸を介して回動自在に取り付けられている。また、固定ハンドル２には、先端が把持部５に接続され、基端が振動子７に接続された細長のプローブ８が取り付けられている。

【０１３４】

また、挿入部４の基端側であって、回動ノブ５０の先端近傍に、挿入部４を覆うスライダ受け５１が設けられており、該スライダ受け５１は、基端部が回動ノブ５０の先端側の内周と、挿入部４の外周との間に固定されている。

【０１３５】

スライダ受け５１の先端に、ストッパ５４が被覆されており、スライダ受け５１のストッパ５４とスライド受け５１の基端部との間に、Ｃリング５２，５３が、それぞれ被覆されている。

【０１３６】

スライダ受け５１を覆うように、挿入部４の外周には、スライダ部材５５が被覆されている。スライダ部材５５の基端部に、フランジ状の保持部５６が設けられており、該保持部５６の内周には、図２４に示すように、スライダ受け５１と摺動自在に当接する凸部５

７が形成されている。

【０１３７】

さらに、図２５、図２６に示すように、スライダ部材５５によって、被覆された挿入部４の外周であって、スライダ受け５１が設けられていない部位には、挿入部４に沿って直線状のスライダ６３が形成されている。

【０１３８】

また、スライダ部材５５の先端部に、接続部５８が形成されており、該接続部５８に、挿入部４に沿って細長の板バネ５９の基端部が接続されている。板バネ５９の先端部に、湿らせたガーゼ等の冷却部６０が設けられており、該冷却部６０は、図２４に示すように、通常は、把持部５を支持する先端カバー６１に形成されたテーパ面６２に当接している。

【０１３９】

次に、このように構成された本実施の形態の作用について説明する。

把持部５による体腔内の処置対象組織の超音波処置終了後、図２４に示す位置から図２５に示す位置に、スライダ部材５５をスライド移動させることで、テーパ面６２に当接している冷却部６０を、プローブ８の先端側に当接させる。このことにより、プローブ８の先端側は冷却される。

【０１４０】

尚、この際、図２５に示すように、スライダ部材５５は、凸部５７がストッパ５４とＣリング５２とにより挿入軸方向の移動が規制されることにより、固定される。

【０１４１】

プローブ８の冷却後、図２５に示す位置から、図２４に示す位置にスライダ部材５５をスライダ移動させる。この際、スライダ部材５５の保持部５６の基端側を、回動ノブ５０の先端側に突き当たるまで移動させることで、凸部５７はＣリング５２，５３を押し潰しながら基端側にスライド移動する。

【０１４２】

また、スライダ部材５５がスライド移動すると、接続部５８及び板バネ５９も同時に基端側に移動する。尚、接続部５８がスライド移動する際は、挿入部４の外周に設けられたスライダ６３により、挿入軸に沿って、回転することなくスライド移動するようガイドされる。

【０１４３】

また、冷却部６０は、先端カバー６１のテーパ面６２を摺動しながら、基端側にスライド移動する。この際、図２４に示すように、板バネ５９の先端側は湾曲する。

【０１４４】

図２４の位置に移動されたスライダ部材５５は、凸部５７がＣリング５３と回動ノブ５０とにより挿入軸方向の移動が規制されることにより、固定される。

【０１４５】

このように、本実施の形態の超音波処置具４０１においては、処置後のプローブ８を冷却する際、流体を用いずに、挿入部４に被覆されたスライダ部材５５を挿入軸方向にスライド移動させることにより、冷却部６０を、プローブ８に当接させることにより行うと示した。

【０１４６】

このことにより、超音波処置具を送水・送気装置や吸引装置と接続しなくても、超音波処置により摩擦熱で高温となったプローブを冷却することができるため、低コストにて、処置後のプローブを冷却することができる。

【０１４７】

尚、この場合、超音波処置中に発生する煙やミスト等は吸引することができないが、本実施の形態を、上述した第１～第３実施の形態と組み合わせて用いることにより、煙やミスト等の吸引も実現できる。

【０１４８】

尚、以下、変形例を示す。

上述した第１～第４の実施の形態においては、医療用処置具には、凝固切開用の超音波処置具を例に挙げて説明したが、これに限らず、熱を利用して処置を行う医療用処置具または内視鏡下用医療用処置具であれば、本実施の形態が適用可能であるということは、勿論である。

【０１４９】

具体的には、高周波電流によるジュール熱等を利用した高周波処置具、レーザー光を利用したレーザー処置具、電磁波を利用したＲＦ処置具、発熱鉗子等により熱を発生させて処置を行う処置具等にも適用することができることは云うまでもない。

【０１５０】

（第５実施の形態）

図２７は、本発明の第５実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図、図２８は、図２７の挿入部の基端部側の拡大断面図、図２９は、図２８中のIIXIX-IIXIX線に沿う断面図、図３０は、図２７の挿入部の先端側の拡大断面図、図３１は、図３０中のIIIXI-IIIXI線に沿う断面図、図３２は、図２７の超音波処置具を有する超音波処置装置の構成の概略を示すブロック図である。

【０１５１】

図２７に示すように、超音波処置具５０１は、体腔内に挿入される細長な挿入部４を有して構成されており、挿入部４の先端側に、処置部である把持部５が配設されている。尚、把持部５は、例えば開閉自在な一対のジョーから構成されており、該ジョーにより、体腔内の処置対象組織を把持して加熱し、凝固切開等の処置を行う。

【０１５２】

また、挿入部４の基端側は、操作部である回動ノブ５０３の先端に接続されている。尚、回動ノブ５０３は操作部である固定ハンドル２の先端に接続されている。回動ノブ５０３は、挿入部４の軸心を回転中心として、該挿入部４を軸周り方向に回転操作するものである。

【０１５３】

さらに、固定ハンドル２に、把持部５の一対のジョーを開閉操作する可動ハンドル６が、枢支軸を介して回動自在に取り付けられている。また、固定ハンドル２に、先端が把持部５に接続され、基端が振動子７に接続された細長なプローブ８が、挿入部４に挿通されて取り付けられている。

【０１５４】

尚、プローブ８は、電源本体から供給された電気エネルギである電力により発生する熱を利用して処置対象組織に対し、凝固等の各種処置を行うものであることから、プローブ８の先端側である把持部５に接続された部位は、処置部を構成している。

【０１５５】

また、挿入部４の外周、具体的には、挿入部４の把持部５及びプローブ８の先端側を除いた外周に、筒状部材である送水吸引シース５０９が装着されている。シース５０９から把持部５及びプローブ８の先端側が突出されている。尚、シース５０９は、挿入部４の外周の少なくとも一部に対して着脱可能である。即ち、挿入部４の少なくとも一部は、シース５０９内に挿通されている。

【０１５６】

図２８に示すように、シース５０９は、例えばフランジ状の本体部５１０と、該本体部５１０の該中央から先端側に延出した、本体部５１０より小径な挿入部５１１と、本体部５１０の該中央から基端側に延出した、本体部５１０より小径な接続部５１５とを有して主要部が構成されている。

【０１５７】

挿入部５１１の孔の内径は、挿入部４の外径より大径に形成されている。このことにより、挿入部５１１の内周と挿入部４の外周との間に流路５１２が形成されている。また、本体部５１０に、該本体部５１０を先端から基端まで連通する孔に略垂直な流路５１０ｒ

、５１０１が形成されている。尚、流路５１０ｒ、５１０１は、流路５１２に連通している。

【０１５８】

さらに、本体部５１０に、後述する送水吸引装置５２９（図３２参照）と接続するための流入口である送水ポート５１３が挿入部５１１に対し略垂直となるように設けられている。送水ポート５１３は流路５１３ｒを有しており、該流路５１３ｒは本体部５１０の流路５１０ｒと連通している。即ち、流路５１３ｒは流路５１２とも連通している。尚、送水ポート５１３は、図示しない送気装置と接続可能であってもよい。

【０１５９】

また、図２９に示すように、本体部５１０に、後述する排煙機能を有する気腹器５３０（図３２参照）と接続するための流出口である吸引ポート５１４が、挿入部５１１に対し略垂直になるように設けられている。吸引ポート５１４は、流路５１４ｒを有しており、該流路５１４ｒは、本体部５１０の流路５１０１と連通している。即ち、流路５１４ｒは、流路５１２とも連通している。

【０１６０】

尚、送水ポート５１３、吸引ポート５１４は、超音波処置具５０１と干渉しない範囲であれば、挿入部５１１に対して略垂直に限らず、本体部５１０に、取り付け角度を自由にして設けることができる。

【０１６１】

また、送水ポート５１３、吸引ポート５１４は、把持部５及びプローブ８の先端側からなる処置部に対し供給される流体の流路５１２への供給と、体腔内から吸引される流体の流路５１２からの排出との少なくとも一方を行う流出入口を構成している。

【０１６２】

送水ポート５１３の外周に、送水ポート５１３と送水吸引装置５２９とを接続する、後述する送水チューブ５３１（図３２参照）の一端が被覆される。尚、送水チューブ５３１は、送水吸引装置５２９に限らず、図３２に示す超音波吸引処置具５３２にも接続することができる。この場合、送水ポート５１３は超音波吸引処置具５３２の図示しない送水ポートと共通の形状に形成される。

【０１６３】

図２９に示すように、吸引ポート５１４の突出した先端に、吸引ポート５１４と気腹器５３０とを接続する、後述する排気チューブ５３３が接続できるように、排気チューブ５３３の図示しないルアロックコネクタと接続するためのルアロック口金５１６が設けられている。

【０１６４】

図２８に示すように、本体部５１０の接続部５１５に、基端側に向けて開口する凹部５１７が設けられており、凹部５１７に、例えばＯリング等からなる弾性部材５１８が嵌入されている。

【０１６５】

弾性部材５１８のＯリングの孔の内径は、挿入部４が挿入可能な程度に挿入部４の外径よりも小さく形成されている。弾性部材５１８のＯリングの孔に挿入部４が挿入された際、弾性部材５１８が、凹部５１７の内周面と挿入部４との間において弾性変形されることにより、挿入部４と弾性部材５１８との間の気密が保たれる。即ち、弾性部材５１８は、弾性変形された状態で挿入部４の外周と密着される。

【０１６６】

また、接続部５１５の基端部５１９に、凹部５１７の開口が形成されており、該開口の内周は、挿入部４の外径よりも大きく、回動ノブ５０３の先端側の径よりも小さく形成されている。

【０１６７】

超音波処置具５０１の回動ノブ５０３の先端に、少なくとも１つの係合手段である係合要素５４４が設けられており、シース５０９の接続部５１５の基端部５１９に、係合要素

５４４が係合される係合手段である係合受け部５４５が設けられている。

【０１６８】

係合要素５４４と係合受け部５４５とは、超音波処置具５０１の挿入部４がシース５０９内に挿入された後、係合要素５４４と係合受け部５４５とが係合されると、図３０に示すように、シース５０９の先端開口部５４３が、図３０中下側であるプローブ８側に位置されるよう、基端部５１９、回動ノブ５０３においてそれぞれ設けられている。

【０１６９】

挿入部４がシース５０９内に挿入され、係合要素５４４と係合受け部５４５とが係合された状態で、回動ノブ５０３が回転されると、係合要素５４４と係合受け部５４５との係合により、回動ノブ５０３とシース５０９とが連動して回転される。

【０１７０】

この際、シース５０９の先端開口部５４３とプローブ８との位置関係は、回動ノブ５０３とシース５０９とが連動して回転されることにより変わらないことから、即ち、開口部５４３は、常にプローブ８及び把持部５の近傍に位置することから、流路５１３ｒ、５１０ｒ、５１２、５２６を通過した流体は、確実に、プローブ８及び把持部５に供給され、その結果、プローブ８及び把持部５が冷却される。尚、開口部５４３は、把持部５よりプローブ８の先端側の近傍位置に位置されている。即ち、開口部５４３は、少なくともプローブ８の先端側に対して開口されている。

【０１７１】

図３０に示すように、挿入部４にシース５０９を装着したときのシース５０９の先端は、把持部５及びプローブ８の先端側が露出されるように、把持部５よりも基端側に位置する。また、シース５０９の先端側は、テーパ状に形成されている。

【０１７２】

図３１に示すように、挿入部５１１の先端側の内周に、挿入部４の外周と当接する支持部５２４が形成されており、また、挿入部５１１の先端側の内周に円弧５２５が形成されている。円弧５２５も、係合要素５４４と係合受け部５４５との係合位置により、挿入部４にシース５０９を装着した際、図３０中下側、即ち、プローブ８側に位置する。

【０１７３】

円弧５２５と挿入部４の外周との間に、先端流路５２６が形成されている。先端流路５２６は、挿入部５１１の内周と挿入部４の外周との間に形成された流路５１２と連通している。

【０１７４】

図３２に示すように、超音波処置装置５００は、超音波処置具５０１と超音波吸引処置具５３２と電気メス本体５２７と超音波出力装置５２８と送水吸引装置５２９と気腹器５３０と電気メススイッチ５３４と超音波振動スイッチ５３５と送水吸引スイッチ５３６とを有して主要部が構成されている。

【０１７５】

超音波処置具５０１の振動子７は、超音波ケーブル５３７によって超音波駆動を行う超音波出力装置５２８に接続されている。また、超音波吸引処置具５３２の図示しない振動子も同様に、超音波出力装置５２８に接続可能である。また、超音波出力装置５２８に、振動子７を発振させるための超音波振動スイッチ５３５が接続されている。

【０１７６】

超音波出力装置５２８と電気メス５２７と送水吸引装置５２９と気腹器５３０とは、連動して作動できるよう通信ケーブル５３８により互いに電気的に接続されている。さらに、送水吸引装置５２９は、送水チューブ５３１により超音波処置具５０１の送水ポート５１３に接続されている。尚、送水吸引装置５２９に接続された送水チューブ５３１は、超音波吸引処置具５３２の図示しない送水ポートにも接続可能である。

【０１７７】

吸引部である気腹器５３０は、排気チューブ５３３により超音波処置具５０１の吸引ポート５１４に接続されている。気腹器５３０は、さらに送気チューブ５３９により、既知

のトロッカ５４０に接続されている。尚、トロッカ５４０には、排気チューブ５３３も接続可能である。

【０１７８】

また、電気メス５２７は、電気メスケーブル５４１により超音波処置具５０１と超音波吸引処置具５３２とにそれぞれ接続可能である。さらに、送水吸引装置５２９は、吸引チューブ５４２により超音波吸引処置具５３２に接続可能である。

【０１７９】

送水吸引装置５２９により流体が送水された場合、流体は、送水吸引装置５２９に接続された送水チューブ５３１を介して、送水ポート５１３の流路５１３ｒに進入した後、流路５１０ｒ、流路５１２を通過して、先端流路５２６の先端開口部５４３から、把持部５及びプローブ８の先端側に送水される。尚、この場合、送水吸引装置５２９は送気装置でもよく、運ばれる流体は気体であっても良い。

【０１８０】

ここで、先端開口部５４３の開口面積は、流路５１２の管路面積よりも小さく形成されている。よって、先端開口部５４３にて先端流路５２６がノズル状に絞られるため、先端開口部５４３から送水される流体の流速が早くなる。

【０１８１】

これは、流路５１２の断面積をＡ１、開口部５４３の断面積をＡ２とすると、既知のベルヌーイの定理により、Ｖ１Ａ１＝Ｖ２Ａ２（Ｖ１：流路内流速、Ｖ２開口部流速）の関係が成り立ち、Ｖ１を一定とすると流速Ｖ２は、Ｖ２＝Ｖ１（Ａ１／Ａ２）の関係から、既知のベンチュリー効果により、管路断面積Ａ１に対して開口断面積Ａ２の値が小さいと、Ｖ２が大きくなるためである。

【０１８２】

よって、本実施の形態のように、流路５１２の管路面積に対して小さい面積の開口部５４３を一箇所設けることにより、開口部５４３における流速Ｖ２は、流路５１２での流速Ｖ１と比較して大きくなる。

【０１８３】

特に、超音波処置具５０１のシース５０９の外径を５～１０ｍｍとして設計した場合、断面積Ａ１に対して、断面積Ａ２を３０％以下とするのが良く、好ましくは、５～１０％がより効果的である。

【０１８４】

また、先端開口部５４３は、上述したように、プローブ８側に配置されているため、プローブ８及び把持部５の両方に流体が確実に送られる。

【０１８５】

他方、先端開口部５４３から、気腹器５３０により煙、ミスト等の流体が吸引された場合は、流体は、先端開口部５４３から先端流路５２６に進入した後、流路５１２、５１０１、５１４ｒを通過して吸引ポート５１４に接続された排気チューブ５３３を介して、気腹器５３０より排出される。

【０１８６】

次に、このように構成された本実施の形態の超音波処置具５０１の作用について図２７～図３２、及び図３３を用いて説明する。図３３は、図２７の超音波処置具を用いて、体腔内の処置対象組織の処置を行う際の超音波処置装置の制御方法を示したフローチャートである。

【０１８７】

先ず、超音波処置具５０１の挿入部４に、シース５０９が、該シース５０９の基端部側から、挿入部４の先端側に対し回動ノブ５０３に突き当たるまで装着され、係合要素５４４と係合受け部５４５とが係合されると、図２８に示すように、凹部５１７の内周面と挿入部４の外周面との間で弾性部材５１８が弾性変形され、該弾性部材５１８が挿入部４に対し密着される。尚、この際、上述したように挿入部４の外周とシース５０９の挿入部５１１の内周との間に、流路５１２が形成される。

【０１８８】
その後、送水ポート５１３と送水吸引装置５２９とが送水チューブ５３１で接続され、さらに吸引ポート５１４と気腹器５３０とが排気チューブ５３３で接続された後、超音波処置具５０１の挿入部４が体腔内に挿入され、体腔内の処置組織の処置が行われる。
【０１８９】
尚、以下の動作は、超音波処置装置５００の超音波出力装置５２８内に配設された制御部である制御手段５７０から送水吸引装置５２９及び気腹器５３０へ、通信ケーブル５３８を介して制御信号が送られることによって行われる。即ち制御手段５７０の動作制御により行われる。
【０１９０】
体腔内の処置対象組織の処置を行う際は、把持部５により処置対象となる処置対象組織が把持された後、図３３に示すように、先ず、ステップＳ２１において、超音波振動スイッチとなる超音波振動スイッチ５３５がオン操作されることにより、超音波出力装置５２８からの電力の供給を受け、振動子７は超音波駆動を行う。
【０１９１】
振動子７の振動は、プローブ８を介して把持部５に伝達される。このことにより、処置対象組織は、先端側のプローブ８の振動による処置対象組織との摩擦により加熱され、凝固切開等の処置が行われる。
【０１９２】
次いで、ステップＳ２２において、送水吸引装置５２９の作動により、先端開口部５４３から、把持部５及びプローブ８に対して、流体が送水されているか否かが判定される。
【０１９３】
一方、先端開口部５４３から流体が送水されている場合は、ステップＳ２３に分岐し、送水吸引装置５２９が停止されることにより、先端開口部５４３からの流体の送水が停止され、続くステップＳ３０で超音波振動スイッチ５３５がオンであることが再度確認された後、ステップＳ２４に移行する。他方、ステップＳ２２において、先端開口部５４３から流体が送水されていない場合は、ステップＳ２４に移行する。
【０１９４】
ステップＳ２４では、把持部５により処置対象組織が加熱処置されると連動して、気腹器５３０が作動されることにより、処置の際に発生したミストや煙の吸引が行われる。具体的には、気腹器５３０により吸引された流体は、先端開口部５４３から先端流路５２６に進入した後、流路５１２、５１０１、５１４ｒを流れて、吸引ポート５１４に接続された排気チューブ５３３を介して、気腹器５３０より排出される。
【０１９５】
把持部５による処置対象組織の処置が終了すると、ステップＳ２５において、スイッチ５３５がオフ操作されることにより、超音波出力装置５２８からの電力供給が遮断され、振動子７が停止する。
【０１９６】
次いで、振動子７の停止と連動して、ステップＳ２６では、気腹器５３０が停止されることにより、処置の際に発生したミストや煙の吸引が停止される。この場合、気腹器５３０の停止は、振動子７の停止と同期させずに、振動子７の停止より遅らせてもよい。その後、ステップＳ２７に移行する。
【０１９７】
ステップＳ２７では、送水吸引装置５２９が、あらかじめ設定された時間である数秒間だけ作動されることにより、把持部５またはプローブ８に対して、先端開口部５４３から流体が送水される。
【０１９８】
具体的には、送水吸引装置５２９から供給された流体は、送水チューブ５３１を介して、送水ポート５１３の流路５１３ｒに進入した後、シース５０９の挿入部５１１の流路５１２を流れて、先端流路５２６の先端開口部５４３から、上述したように、ベンチュリー

効果により流速が増した状態で、把持部５またはプローブ８に送水される。

【０１９９】

このことにより、処置により熱された把持部５またはブローブ８は冷却される。また、処置により付着した把持部５及びプローブ８の汚れが、流体の送水により除去される。

【０２００】

次いで、ステップＳ２８では、先端開口部５４３から、流体が送水された時間が、あらかじめ設定された数秒間を経過したか否かが判定される。あらかじめ設定された数秒間経過していなければ、ステップＳ２２に戻り、続くステップＳ２３において、流体の送気または送水時間が数秒間経過後、送水吸引装置５２９が停止され、続くステップ３０において、スイッチ５３５のオフが確認された後、ルーチンが終了される。

【０２０１】

ステップＳ２８に戻って、先端開口部５４３から流体が送水された時間が、あらかじめ設定された数秒間を経過しておれば、ステップＳ２９に移行し、送水吸引装置５２９が停止されることにより、先端開口部５４３からの流体の送水が停止され、その後、ルーチンが終了する。

【０２０２】

このように、本実施の形態の超音波処置具５０１においては、超音波処置具５０１に、流体を送水するための流路５１０ｒ、５１２、５１３ｒ、５２６が設けられているとともに、処置の際、体腔内から流体を吸引する流路５１０１、５１２、５１４ｒ、５２６が設けられていると示した。また、挿入部４と挿入部５１１との間に段けられた流路５１２は、流体を送水するための流路であるとともに、体腔内から流体を吸引する流路を兼ねていると示した。されに、流路５１０ｒ、５１０１、５１２、５１３ｒ、５１４ｒ、５２６の先端開口部５４３が、プローブ８の近傍側に位置されるよう、超音波処置具５０１の先端側に設けられていると示した。

【０２０３】

このような構成によれば、超音波処置の際に発生する煙やミストが、気腹器５３０により、流路５１０１、５１２、５１４ｒ、５２６を介して効果的に吸引されることから、術者の視野を常に確保したまま、処置具を用いた処置を確実に行うことができる。

【０２０４】

また、超音波処置後、摩擦熱により高温となった把持部５及びプローブ８に送水吸引装置５２９により、流路５１０ｒ、５１２、５１３ｒ、５２６を介して開口部５４３から、ベンチュリー効果により流速が増した流体を送水することができるため、処置後発熱した把持部５及びプローブ８を、先端開口部５４３の断面積Ａ２を絞り込まない場合よりも少ない送水量で短時間に冷却することができる。

【０２０５】

さらに、先端開口部５４３がプローブ８の近傍に設けられているとともに、係合要素５４４と係合受け部５４５との係合により、先端開口部５４３がプローブ８側に位置されることから、プローブ８がいかなる方向を向いていたとしても、確実に流体をプローブ８に供給することができることから、発熱源であるプローブ８を、確実に冷却することができる。

【０２０６】

以上のことから、術者にとって、使い勝手を向上した超音波処置具５０１を提供することができる。尚、その他の効果は、上述した第１実施形態の超音波処置具１と同様である。

【０２０７】

尚、以下、変形例を示す。本実施の形態の超音波処置装置５００の構成によれば、超音波出力の際、煙、ミストの吸引のみならず、通信ケーブル５３８によって気腹器５３０に接続された電気メス５２７から超音波処置具５０１及び超音波吸引処置具５３２に高周波を供給することができる。即ち、高周波出力を行っている際にも超音波出力時と同様に気腹器５３０が連動して煙、ミストの吸引を行うことができる。

【０２０８】
また、先端開口部５４３から送水される流体は、処置後の把持部５及びプローブ８を冷却するために用いられると示した。これに限らず、本実施の形態においても、流体が体腔内に送水されることにより、流体は、体腔内の洗滌に用いられてもよい。
【０２０９】
さらに、シース５０９内に挿入される超音波処置具５０１は、電気メス５２７に接続可能な図示しない高周波処置具であってもよく、この場合であっても、本実施の形態と同様に、流体の送水及び吸引が可能である。
【０２１０】
（第６実施の形態）
図３４は、本発明の第６実施の形態を示す超音波処置具を有する超音波処置装置の制御方法を示したフローチャートである。
【０２１１】
本実施の形態の超音波処置具を有する超音波処置装置の制御方法は、図３３に示した第５実施の形態と比して、把持部５により処置対象組織が加熱処置される前に、気腹器５３０により吸引が行われる点が異なる。尚、超音波処置具、超音波処置装置の構成は、第５実施形態と同一である。よって、この相違点のみを説明し、第５実施の形態と同様の構成には同じ符号を付し、その説明は省略する。
【０２１２】
図３４に示すように、先ずステップＳ３１において超音波振動スイッチ５３５がオン操作され音信号が入力される。次いで、ステップＳ２２において、送水吸引装置５２９の作動により、先端開口部５４３から、把持部５及びプローブ８に対して、流体が送水されているか否かが判定される。
【０２１３】
先端開口部５４３から流体が送水されている場合は、ステップＳ２３に分岐し、送水吸引装置５２９が停止されることにより、開口部５４３からの流体の送水が停止され、続くステップＳ３０において、スイッチ５３５がオンであることが再度確認された後、ステップＳ２４に移行する。ステップＳ２２において、先端開口部５４３から流体が送水されていない場合は、ステップＳ２４に移行する。
【０２１４】
ステップＳ２４では、超音波出力装置５２８から通信ケーブル５３８を介して気腹器５３０に制御信号が送られ、気腹器５３０により、煙等の吸引が開始される。続くステップＳ３２では、気腹器５３０から通信ケーブル５３８を介して超音波出力装置５２８に、吸引開始の制御信号が送られ、それを受けて超音波出力装置５２８から振動子７に電力が供給されて超音波出力が開始される。尚、この超音波出力は、吸引開始後、一定時間経過後に開始されても構わない。その後、ステップＳ２５に移行する。
【０２１５】
尚、以下、ステップＳ２５～ステップＳ２９は、上述した第５実施形態のステップＳ２５～ステップＳ２９と同一であるため、その説明は省略する。
【０２１６】
本実施の形態によれば、処置対象組織が超音波を用いて加熱処置される前に、気腹器５３０による吸引を先に作動させることにより、超音波出力を介して処置を行う際のミスト及び煙が確実に吸引されるため、術者の視野を良好に保ち、使い勝手のよい超音波処置具５０１を提供することができる。尚、その他の効果は、上述した第５実施の形態と同様である。
【０２１７】
（第７実施の形態）
図３５は、本発明の第７実施の形態を示す超音波処置具のシースの先端側の拡大断面図、図３６は、図３５中のIIIXVI-IIIXVI線に沿う断面図である。
【０２１８】

本実施の形態の超音波処置具の構成は、図２７～図３３に示した第５実施の形態と比して、先端開口部を複数設けた点が異なる。よって、この相違点のみを説明し、第５実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【０２１９】

図３５に示すように、超音波処置具６０１の挿入部４に、第５実施の形態のシース５０９と同様の構成を有する筒状部材であるシース６０９を装着したときのシース６０９の先端は、把持部５及びプローブ８の先端側が露出されるように、把持部５よりも基端側に位置する。

【０２２０】

図３６に示すように、挿入部６１１の先端部側の内周に、挿入部４の外周と当接する支持部６２４が形成されており、また、挿入部６１１の先端部の内周に円弧６２５が、例えば４箇所において形成されている。尚、円弧６２５の形成箇所は、複数であればいくつでもよい。

【０２２１】

４つの円弧６２５と挿入部４の外周との間には、４つの先端流路６２６が形成されており、該先端流路６２６は、挿入部６１１の内周と挿入部４の外周との間に形成された流路６１２と連通している。

【０２２２】

４つの円弧６２５と挿入部４の外周との間に、４つの先端流路６２６の先端側の開口である先端開口部６４３が、４つ形成されている。尚、本実施の形態における４つの先端開口部６４３の断面積の合計は、第５実施形態の先端開口部５４３の断面積に略等しくなっている。尚、４つの先端開口部６４３は、把持部５よりプローブ８の近傍に、把持部５及びプローブ８対向して開口され、把持部５よりプローブ８の先端側の近傍位置に位置されている。即ち、４つの先端開口部６４３は、少なくともプローブ８の先端側に対して開口されている。

【０２２３】

尚、本実施の形態の超音波処置具６０１においては、上述した第５実施の超音波処置具５０１の回動ノブ５０３の先端に設けられた係合要素５４４及びシース５０９の接続部５１５の基端部５１９に設けられた係合受け部５４５が配設されない構成となっている。

【０２２４】

このような、本実施の形態の超音波処置具６０１の構成によれば、先端開口部６４３が複数設けられていることにより、上述した第５実施の形態のように、先端開口部６４３を、プローブ８に対して位置決めする必要がなくなることから、挿入部４を、シース６０９内に対しどの方向に挿入したとしても、送水吸引装置５２９から流体を送水した際に、プローブ８及び把持部５に送水することができる。よって、確実にプローブ８及び把持部５を冷却することができる。尚、その他の効果は、上述した第５実施の形態と同様である。

【０２２５】

（第８実施の形態）

図３７は、本発明の第８実施の形態を示す超音波処置具の先端側の拡大断面図、図３８は、図３７中におけるIIIXVIII-IIIXVIII線に沿う断面図、図３９は、図３７中におけるIIIXIX-IIIXIX線に沿う断面図である。

【０２２６】

本実施の形態の超音波処置具の構成は、図２７～図３３に示した第５実施の形態と比して、シースの挿入部に先端開口部以外の側面開口部が設けられている点が異なる。よって、この相違点のみを説明し、第５実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【０２２７】

図３７に示すように、超音波処置具７０１の挿入部４に第５実施の形態のシース５０９と同様の構成を有する筒状部材であるシース７０９を装着したときのシース７０９の先端は、把持部５及びプローブ８の先端側が露出されるように、把持部５よりも基端側に位置

する。

【０２２８】

また、図３８、図３９に示すように、挿入部７１１の先端側の内周に、挿入部４の外周と当接する支持部７２４が形成されており、また、挿入部７１１の先端側の内周に、複数、例えば４つの円弧７２５が形成されている。

【０２２９】

４つの円弧７２５と挿入部４の外周との間に、４つの先端流路７２６が形成されており、該先端流路７２６は、挿入部７１１の内周と挿入部４の外周との間に形成された流路７１２と連通している。

【０２３０】

また、シース７０９の挿入部７１１の先端側に、図３８に示すように、側面開口部７４６が、円周上に９０度毎に４箇所設けられており、さらに、図３９に示すように、シース７０９の図３８に示す位置よりも基端側にも、図３８に示す位置から、円周上に４５度それぞれずらした位置に、側面開口部７４６が４箇所設けられている。

【０２３１】

このような、超音波処置具７０１の構成によれば、把持部５よりプローブ８の近傍に、少なくともプローブ８の先端側に対向するよう開口され、把持部５よりプローブ８の先端側の近傍位置に位置されている先端開口部７４３からミストや煙を気腹器５３０にて吸引する際、例え先端開口部７４３が組織や血液により塞がれていたとしても、側面開口部７４６から吸引を行うことができる。尚、その他の効果は、上述した第５実施の形態と同様である。

【０２３２】

（第９実施の形態）

図４０は、本発明の第９実施の形態を示す超音波処置具を有する超音波処置装置の構成の概略を示すブロック図、図４１は、図４０の音波処置装置の制御方法を示したフローチャートである。

【０２３３】

本実施の形態の超音波処置具を有する超音波処置装置の制御方法は、図３３に示した第５実施の形態と比して、把持部５による処置対象組織の加熱処置後も、送水のみならず気腹器５３０により吸引が行われる点が異なる。尚、超音波処置具、超音波処置装置の構成は、第５実施形態と同一である。よって、この相違点のみを説明し、第５実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【０２３４】

図４０に示すように、超音波処置装置７５０の気腹器５３０に、トロッカ５４０とは異なる別の吸引用のトロッカ７９０が、排気チューブ７８３を介して接続されている。尚、本実施の形態においては、シース７５９は吸引ポートを有していなくともよい。

【０２３５】

図４１に示すように、先ずステップＳ３１において超音波振動スイッチ５３５がオン操作され信号が入力される。次いで、ステップＳ４１において、送水吸引装置５２９の作動により、先端開口部から、把持部５及びプローブ８に対して、流体が送水されているか、及び気腹器５３０の動作により、トロッカ７９０から煙、ミスト等が吸引されているか否かが判定される。

【０２３６】

先端開口部５４３から流体が送水され、トロッカ７９０により煙、ミスト等が吸引されている場合は、ステップＳ４９に分岐し、送水吸引装置５２９、気腹器５３０が停止されることにより、開口部からの流体の送水が停止され、トロッカ７９０の煙、ミスト等の吸引が停止され、続くステップＳ５０において、スイッチ５３５がオンであることが再度確認された後、ステップＳ４２に移行する。ステップＳ４１において、先端開口部から流体が送水されていない場合、及びトロッカ７９０により煙、ミスト等が吸引されていない場合は、ステップＳ４２に移行する。

【０２３７】
ステップＳ４２では、超音波出力装置５２８からの電力の供給を受け、振動子７は超音波駆動を行う。このことにより、処置対象組織は、超音波処置具７５１の先端側のプローブ８の振動による処置対象組織との摩擦により加熱され、凝固切開等の処置が行われる。
【０２３８】
続く、ステップＳ４３では、超音波出力装置５２８から通信ケーブル５３８を介して気腹器５３０に制御信号が送られることにより、気腹器５３０は、トロッカ７９０により吸引を開始する。尚、該吸引は、振動子７の超音波駆動と略同時に行われる。
【０２３９】
把持部５による処置対象組織の処置が終了すると、ステップＳ４４において、スイッチ５３５がオフ操作されることにより、続くステップＳ４５において、超音波出力装置５２８からの電力供給が遮断され、振動子７が停止する。
【０２４０】
ステップＳ４６では、送水吸引装置５２９及び気腹器５３０が、あらかじめ設定された時間である数秒間だけ作動されることにより、把持部５またはプローブ８に対して、先端開口部から流体が送水されるとともに、トロッカ７９０から、煙、ミスト等が吸引される。
【０２４１】
次いで、ステップＳ４７では、流体が送水された、及び吸引された時間が、あらかじめ設定された数秒間を経過したか否かが判定される。あらかじめ設定された数秒間経過していなければ、ステップＳ４１に戻り、続くステップＳ４９において、流体の送水、吸引時間が数秒間行われた後、送水吸引装置５２９、気腹器５３０が停止され、続くステップ５０において、スイッチ５３５のオフが確認された後、ルーチンを終了する。
【０２４２】
ステップＳ４７に戻って、流体が送水、吸引された時間が、あらかじめ設定された数秒間を経過しておれば、ステップＳ４８に移行し、送水吸引装置５２９、気腹器５３０が停止され、その後、ルーチンが終了する。
【０２４３】
このように、本実施の形態によれば、超音波処置後、吸引動作を延長することができるため、より長時間、ミストや煙の吸引ができることから、術者の視野を良好に保つことができる。尚、その他の効果は、上述した第５実施の形態と同様である。
【０２４４】
（第１０実施の形態）
図４２は、本発明の第１０実施の形態を示す超音波処置具の挿入部の基端部側の拡大断面図、図４３は、図４２中のIVXIII-IVXIII線に沿う断面図である。
【０２４５】
本実施の形態の超音波処置具の構成は、図２７～図３３に示した第５実施の形態と比して、回動ノブを回転させた際、送水ポートに接続された送水チューブ、吸引ポートに接続された排気チューブの絡まりを防止する構造を超音波処置具が有している点が異なる。よって、この相違点のみを説明し、第５実施の形態と同様の構成には同じ符号を付し、その説明は省略する。
【０２４６】
図４２に示すように、本実施の形態の超音波処置具８０１の筒状部材であるシース８０９は、本体部８１０と該本体部８１０の内部に設けられた回転部８５０とから主要部が構成されている。
【０２４７】
回転部８５０の先端側、基端側それぞれに突状部８５３が形成されており、突状部８５３は、本体部８１０と回転部８５０との間の先端側、基端側にそれぞれに配設された弾性板８５４に、頂点のみで接触されている。
【０２４８】

挿入部８１１の孔の内径は、挿入部４よりも大径に形成されている。このことにより、挿入部８１１の内周と挿入部４の外周との間に、流路８１２が形成されている。また、回転部８５０に、円周方向に沿って複数の孔８５２が形成されており、該複数の孔８５２は、流路８１２と、本体部８１０の内周と回転部８５０の外周との間の空間８５１とに連通している。よって空間８５１と流路８１２とは連通している。

【０２４９】

さらに、図４３に示すように、本体部８１０に、送水吸引装置５２９と接続するための流入口である送水ポート８１３が設けられている。送水ポート８１３に、送水吸引装置５２９と接続するための送水チューブ５３１が接続される。

【０２５０】

送水ポート８１３は、流路８１３ｒを有しており、該流路８１３ｒは、本体部８１０の流路８１０ｒと連通している。さらに、流路８１３ｒは空間８５１と連通しており、これにより、流路８１３ｒは流路８１２と連通している。

【０２５１】

また、本体部８１０に、排煙機能を有する気腹器５３０と接続するための流出口である吸引ポート８１４が設けられている。吸引ポート８１４に、気腹器５３０と接続するための排気チューブ５３３が接続される。

【０２５２】

吸引ポート８１４は流路８１４ｒを有しており、該流路８１４ｒは、本体部８１０の流路８１０１と連通している。さらに、流路８１４ｒは空間８５１と連通しており、これにより、該流路８１４ｒは流路８１２と連通している。

【０２５３】

また、送水ポート８１３、吸引ポート８１４は、把持部５及びプローブ８の先端側からなる処置部に対し供給される流体の流路８１２への供給と、体腔内から吸引される流体の流路８１２からの排出との少なくとも一方を行う流出入口を構成している。

【０２５４】

回転部８５０の基端部８１９に、基端側に向けて開口する凹部が設けられており、凹部に、例えばＯリング等からなる弾性部材８１８が嵌入されている。弾性部材８１８のＯリングの孔の内径は、挿入部４が挿入可能な程度に挿入部４の外径よりも小さく形成されており、弾性部材８１８のＯリングの孔に挿入部４が挿入された際に、弾性部材８１８は、凹部と挿入部４との間において弾性変形され、挿入部４と弾性部材８１８との間で気密が保たれる。即ち、変形された状態で挿入部４の外周と密着される。また、凹部の開口の内周は、挿入部４の外径よりも大きく、回動ノブ８０３の先端側の径よりも小さく形成されている。

【０２５５】

このような構成を有する超音波処置具８０１の回転部８５０は、突状部８５３の頂点のみで弾性板８５４に接触しており、他の回転部８５０の外周部分は接触していないため、回動ノブ８０３を回転させると、挿入部４に連動して回転部８５０は、本体部８１０に対して回転する。即ち、本体部８１０とは別に回転部８５０のみが回転する。

【０２５６】

このことにより、回動ノブ８０３を回転させた際、送水ポート８１３に接続された送水チューブ５３１、吸引ポート８１４に接続された排気チューブ５３３の絡まりが防止される。尚、その他の効果は、上述した第５実施の形態と同様である。

【０２５７】

（第１１実施の形態）

図４４は、本発明の第１１実施の形態を示す超音波処置具を挿入部の一部のみを断面にして示した図である。

【０２５８】

本実施の形態の超音波処置具の構成は、図２７～図３３に示した第５実施の形態と比して、流体の送水を操作性良く行える構造を超音波処置具が有している点が異なる。よって

、この相違点のみを説明し、第５実施の形態と同様の構成には同じ符号を付し、その説明は省略する。

【０２５９】

図４４に示すように、超音波処置具９０１の挿入部４に、筒状部材であるシース９０９が装着されており、シース９０９に、流入口を有する送水ポート９１３が形成されている。送水ポート９１３に、送水チューブ９３１が着脱自在であり、該送水チューブ９３１は、流体供給部である流体供給源９６５に接続されている。尚、この場合、送水チューブ９３１は送水吸引装置５２９に接続されていても構わない。

【０２６０】

挿入部４の基端側の操作部である固定ハンドル９０２に、ピンチバルブ９６０の切換手段であるレバー９６４が、取り付け手段である取り付け部９６７を介して取り付けられており、レバー９６４に、送水チューブ９３１の一部に当接自在な突起部９６２が設けられている。尚、ピンチバルブ９６０は、取り付け部９６７において、固定ハンドル９０２に対し着脱自在であっても構わない。

【０２６１】

突起部９６２は、流体を先端開口部９４３から送水しない場合は、送水チューブ９３１の一部を押圧し、送水チューブ９３１内を流体が通過しないように送水チューブ９３１の一部を押し潰す。

【０２６２】

送水を行う場合、レバー９６４の一端側が、図４４中、矢印方向に回転されることにより、レバー９６４が、支点９６１を中心に回転され、突起部９６２が送水チューブ９３１から離間する方向に回転される。このことにより、送水チューブ９３１の流路は、開成されることから、把持部５よりプローブ８の近傍に、少なくともプローブ８の先端側に対向するよう開口され、把持部５よりプローブ８の先端側の近傍位置に位置されている先端開口部９４３から流体が送水される。

【０２６３】

流体の送水を停止させる場合には、術者によるレバー９６４の操作が解放されることにより、レバー９６４は、バネ９６３の作用により、送水チューブ９３１の一部を押し潰す元の位置に戻る。

【０２６４】

このような構成によれば、処置の最中に、流路９１２を介する先端開口部９４３からの流体の送水操作を術者の意図するタイミングで操作性良く容易に行うことができる。尚、その他の効果は、上述した第５実施の形態と同様である。

【０２６５】

［付記］

以上詳述した如く、本発明の実施形態によれば、以下の如き構成を得ることができる。即ち、

（１）体腔内に挿入される細長の挿入部と、

前記挿入部の先端に設けられ、前記体腔内の処置対象組織を加熱して処置を行う処置部と、

前記挿入部の少なくとも一部が挿通される筒状部材と、

前記挿入部の外周と前記筒状部材の内周との間に形成され、前記処置部に対し供給する流体と前記体腔内から吸引する流体との少なくとも一方が流れる流路と、

前記流路に連通して、前記処置部に対し供給される流体の前記流路への供給と前記体腔内から吸引される流体の前記流路からの排出との少なくとも一方を行う流出入口と、

前記流路に連通して、前記処置部に対向して開口された開口部と、

を具備することを特徴とする医療用処置具。

【０２６６】

（２）体腔内に挿入される細長の挿入部と、

前記挿入部の先端に設けられ、前記体腔内の処置対象組織に熱を付加して処置を行う処

置部と、
前記挿入部の手前側から先端側まで被覆するとともに、前記処置部を先端側外側へ突出して配置させる中空且つ長尺の筒状部材と、
前記筒状部材に挿通させた前記挿入部と前記筒状部材の内周面との間の空間によって形成され、前記筒状部材の手前側から先端側まで流体の通過が可能な流路と、
前記流路に連通して前記筒状部材の手前側に設けられ、前記流路を介して前記筒状部材の先端側へ供給する前記流体を供給する流体供給源と接続する流体供給用口金と、
前記流路に連通して前記筒状部材の手前側に設けられ、前記流路を介して前記筒状部材の先端側から前記流体を吸引する吸引源と接続する吸引用口金と、
前記流体供給用口金から前記流路を介して前記筒状部材の先端から突出して配置された前記処置部へ流体を供給可能で、且つ、前記吸引口金から前記流路を介して前記処置部近傍から前記流体を吸引する前記筒状部材の先端部に設けられた開口部と、
を具備したことを特徴とする医療用処置具。
【０２６７】
（３）前記筒状部材は、前記内周面の径が挿通された前記挿入部の径よりも大径に形成されているとともに、前記筒状部材から前記挿入部の先端に設けられた前記処置部が突出されていることを特徴とする付記１または２に記載の医療用処置具。
【０２６８】
（４）熱を利用して処置を行うための処置部と体腔内に挿入するための細長い長尺な挿入部とを有する医療用処置具の前記挿入部に着脱自在に取り付けられ、前記挿入部を覆う筒状部材と前記筒状部材は前記挿入部を通すためのチャンネルを具備し、さらに前記処置部近辺に開口部を有し、送水、吸引するための流路と前記流路に送水源、吸引源に接続するための口金とを具備した送水吸引具と、を備えたことを特徴とする医療用処置具。
【０２６９】
（５）前記チャンネルが、前記挿入部と全周に渡り密着しない形状、寸法を有し、前記挿入部に組み付けた状態で、前記挿入部との間にできる空間により前記流路を形成することを特徴とする付記４に記載の医療用処置具。
【０２７０】
（６）前記送水、吸引の制御を、付記１～５に記載の医療用処置具の出力を検知して行うことを特徴とする医療用処置具用送水、吸引制御システム。
【０２７１】
（７）前記医療用処置具は、超音波凝固切開処置具であることを特徴とする付記６に記載の医療用処置具用送水、吸引システム。
【０２７２】
（８）前記医療用処置具は、高周波処置具であることを特徴とする付記６に記載の医療用処置具用送水、吸引システム。
【０２７３】
（９）前記医療用処置具は、レーザー処置具であることを特徴とする付記６に記載の医療用処置具用送水、吸引システム。
【０２７４】
（１０）熱を利用して処置を行うための処置部と体腔内に挿入する細長い長尺な挿入部とを有する医療用処置具と、前記処置部付近に開口部を有し、前記挿入部内に前記処置部に送水、吸引する流路が配設され、さらに前記挿入部基端部に、前記流路に送水源、吸引源と接続するための口金とを具備したことを特徴とする医療用処置具用送水、吸引システム。
【０２７５】
（１１）前記処置部に送水、吸引を行う際にタイミングと時間とを制御する装置を備えたことを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２７６】
（１２）前記処置部を構成する加熱部と、

前記処置部を構成して、前記加熱部に対して開閉する把持部と、
前記把持部に接続して開閉動作させる細長の駆動軸とからなり、
前記駆動軸を通すためのチャンネルが前記挿入部と全周に渡り密着しない形状、寸法を有し、前記挿入部に組み付けた状態で、前記挿入部との間にできる空間により前記流路を形成することを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２７７】
（１３）少なくとも先端側が前記処置部を構成する細長の加熱部と、
前記加熱部を通すためのチャンネルが前記挿入部と全周に渡り密着しない形状、寸法を有し、前記挿入部に組み付けた状態で、前記挿入部との間にできる空間により前記流路を形成することを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２７８】
（１４）前記送水、吸引の制御を、前記医療用処置具の出力を検知して行うことを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２７９】
（１５）前記医療用処置具は、超音波凝固切開処置具であることを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２８０】
（１６）前記医療用処置具は、高周波処置具であることを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２８１】
（１７）前記医療用処置具は、レーザー処置具であることを特徴とする付記１０に記載の医療用処置具用送水、吸引システム。
【０２８２】
（１８）熱を利用して処置を行うための処置部と体腔内に挿入するための細長い長尺な挿入部とを有する医療用処置具において、前記処置部にヒートシンクのための形状を設けたことを特徴とする医療用処置具
（１９）熱を利用して処置を行うための処置部と体腔内に挿入するための細長い長尺な挿入部とを有する医療用処置具において、前記処置部の熱を吸熱するための冷却部材と前記冷却部材を保持し、挿入部に沿って移動可能な冷却装置とを備え、処置後に前記冷却装置を操作することにより、前記冷却部材を前記処置部に接触させて、前記処置部を冷却することを特徴とする医療用処置具用冷却装置。
【０２８３】
（２０）前記冷却部材が生理食塩水に浸された布状部材であることを特徴とする付記１９に記載の医療用処置具用冷却装置。
【０２８４】
（２１）前記冷却部材が生体適合性のある材料からなることを特徴とする付記１９に記載の医療用処置具用冷却装置。
【０２８５】
（２２）前記開口部の断面積が、前記流路の断面積よりも小さいことを特徴とする付記１に記載の医療用処置具。
【０２８６】
（２３）前記処置部は、前記処置対象組織を加熱する加熱部と該加熱部に対して開閉自在な開閉部とからなり、
前記開口部は、少なくとも前記加熱部に対向して開口していることを特徴とする付記１または２２に記載の医療用処置具。
【０２８７】
（２４）前記開口部の断面積が、前記流路の断面積の３０％以下であることを特徴とする付記２２に記載の医療用処置具。
【０２８８】
（２５）前記挿入部の基端側に設けられ、前記挿入部を軸方向に対して回動させる操作

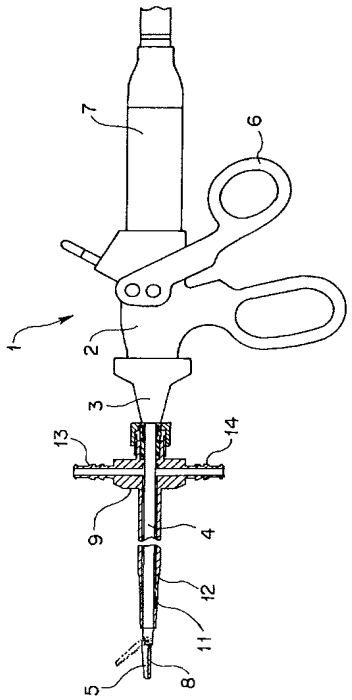
ノブと、
前記操作ノブの回動操作により前記挿入部とともに前記筒状部材を回動可能に前記操作ノブと前記筒状部材とを係合する係合手段と、
を具備することを特徴とする付記２３に記載の医療用処置具。
【０２８９】
（２６）前記加熱部は、超音波振動を伝達するプローブであることを特徴とする付記２３に記載の医療用処置具。
【０２９０】
（２７）体腔内に挿入される細長の挿入部と、
前記挿入部の先端に設けられ、電源から電気エネルギを供給されることにより前記体腔内の処置対象組織を加熱して処置を行う処置部と、
前記挿入部の少なくとも一部が挿通される筒状部材と、
前記挿入部の外周と前記筒状部材の内周との間に形成され、前記体腔内から吸引する流体が流れる流路と、
前記流路に連通して、前記体腔内から吸引される流体を前記流路から排出する流出口と、
前記流路に連通して、前記処置部の近傍位置に設けられた開口部と、
前記流出口に接続され、流体を吸引する吸引部と、
前記電源から電気エネルギが供給されて前記処置部が前記処置対象組織を加熱するに先立って、前記吸引部を所定の時間作動させる制御部と、
を具備することを特徴とする医療用処置具。
【０２９１】
（２８）体腔内に挿入される細長の挿入部と、
前記挿入部の先端に設けられ、前記体腔内の処置対象組織を加熱して処置を行う処置部と、
前記挿入部の基端に設けられた前記処置部を操作する操作部と、
前記挿入部の少なくとも一部が挿通される筒状部材と、
前記挿入部の外周と前記筒状部材の内周との間に形成され、前記処置部に対し供給する流体が流れる流路と、
前記流路に連通して、前記処置部に対し供給する流体を該流路へ流入する流入口と、
前記流路に連通して、前記処置部の近傍位置に設けられた開口部と、
前記流入口に流体を供給する流体供給部と、
前記流入口と前記流体供給部との間に設けられ、流体の供給をオンオフする切換部と、
前記制御部を前記把持部に対し着脱自在とする取り付け手段と、
を具備することを特徴とする医療用処置具。
【０２９２】
付記１～９は、送水吸引シースを医療用処置具の挿入部に装着することで、送水吸引シースの内側と、挿入部の外側にできた隙間で送水吸引流路を形成する。これにより、先端側に設けられた開口部と送水吸引流路と送水吸引シースに設けられた送水吸引ポートを連通させることにより、ミスト吸引や送水、送気をできるようにした。また、出力時に吸引を行い、出力停止時に数秒間吸引を行うことで、出力を検知し送水吸引を制御する。
【０２９３】
また、付記１０～１５は、超音波処置具の回動ノブに送水吸引ポートを設け、送水吸引ポートと、把持部を駆動させるための駆動軸が通る管路である駆動軸チャンネルと、内側シース先端に設けられた開口部を連通させ、送水吸引を行うことができるようにした。また、出力時に吸引を行い、出力停止時に数秒間吸引を行うことで、出力を検知し送水吸引を制御する。
【０２９４】
さらに、付記５，７，９，１１は、上記超音波処置具の電源本体と送水・送気装置と吸引装置を連動させる。送水・送気装置と吸引装置はチューブにより送水ポートと接続させ

る。
【０２９５】
また、付記１６は、プローブの下面に溝を設けることでプローブの表面積を大きくし、超音波処置によって上昇したプローブの温度を放熱しやすいようにした。
【０２９６】
さらに、付記１７～１９は、プローブの下面に冷却用の部材を設け、冷却部材をプローブにあてることで超音波処置によって上昇したプローブの温度を冷ましやすいようにした。
【図面の簡単な説明】
【０２９７】
【図１】本発明の第１実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図。
【図２】図１の挿入部の基端部側の拡大断面図。
【図３】図２中の接続ネジの外周に把持溝を設けた変形例を示す図。
【図４】図１の挿入部の先端側を拡大して示した図。
【図５】図４中のＶ－Ｖ線に沿う断面図。
【図６】図１の超音波処置具を有する超音波処置装置の構成の概略を示すブロック図。
【図７】図１の超音波処置具１の挿入部４からシース９を脱却した分解図。
【図８】図１の超音波処置具を用いて、体腔内の処置対象組織の処置を行う際の超音波処置装置の制御方法を示したフローチャート。
【図９】図１のシースの挿入部の先端側を把持部の先端側を覆う位置に移動させた状態を示す図。
【図１０】本発明の第２実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図。
【図１１】図１０の挿入部の基端部側の拡大断面図。
【図１２】図１０の挿入部の先端部側の拡大断面図。
【図１３】本発明の第３実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図。
【図１４】図１３中のＸＩＶ－ＸＩＶ線に沿う断面図。
【図１５】図１３の挿入部の基端部側の拡大断面図。
【図１６】図１３の挿入部の先端部側の拡大断面図。
【図１７】図１６中のＸＶＩＩ－ＸＶＩＩ線に沿う断面図。
【図１８】図１、図１０、図１３の超音波処置具のプローブの把持部に対向する位置に溝を設けた変形例を示す部分断面図。
【図１９】図１の超音波処置具に、送水送気ポートと吸引ポートとを共通化したポートを１つ設けた変形例を示す部分断面図。
【図２０】図１９の挿入部の基端部側の拡大断面図。
【図２１】図１９の超音波処置具を有する超音波処置装置の構成の概略を示すブロック図。
【図２２】図２１の超音波処置装置のさらに別の構成の概略を示すブロック図。
【図２３】本発明の第４実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図。
【図２４】図２３の挿入部の先端部側を拡大して示した図。
【図２５】図２４のスライダ部材を挿入軸方向先端に移動させた状態を示す図。
【図２６】図２５中のＩＩＸＶＩ－ＩＩＸＶＩ線に沿う断面図。
【図２７】本発明の第５実施の形態を示す超音波処置具を挿入部の一部のみ断面にして示した図。
【図２８】図２７の挿入部の基端部側の拡大断面図。
【図２９】図２８中のIIXIX-IIXIX線に沿う断面図。
【図３０】図２７の挿入部の先端側の拡大断面図。

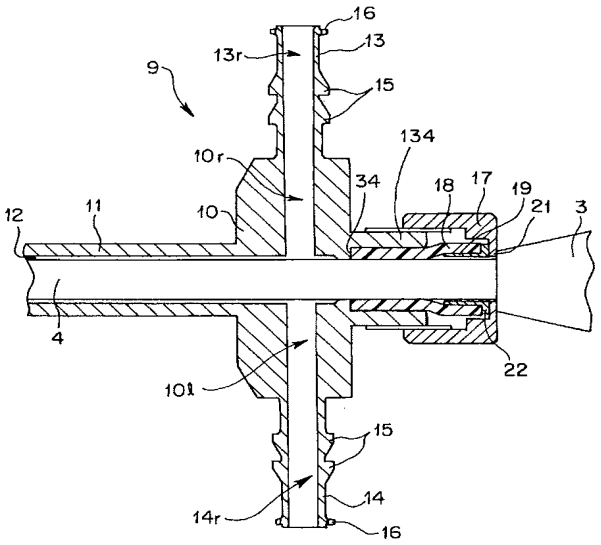
【図３１】図３０中のIIIXI-IIIXI線に沿う断面図。
【図３２】図２７の超音波処置具を有する超音波処置装置の構成の概略を示すブロック図。
【図３３】図２７の超音波処置具を用いて、体腔内の処置対象組織の処置を行う際の超音波処置装置の制御方法を示したフローチャート。
【図３４】本発明の第６実施の形態を示す超音波処置具を有する超音波処置装置の制御方法を示したフローチャート。
【図３５】本発明の第７実施の形態を示す超音波処置具のシースの先端側の拡大断面図。
【図３６】図３５中のIIIXVI-IIIXVI線に沿う断面図。
【図３７】本発明の第８実施の形態を示す超音波処置具の先端側の拡大断面図。
【図３８】図３７中におけるIIIXVIII-IIIXVIII線に沿う断面図。
【図３９】図３７中におけるIIIXIX-IIIXIX線に沿う断面図。
【図４０】本発明の第９実施の形態を示す超音波処置具を有する超音波処置装置の構成の概略を示すブロック図。
【図４１】図４０の音波処置装置の制御方法を示したフローチャート。
【図４２】本発明の第１０実施の形態を示す超音波処置具の挿入部の基端部側の拡大断面図。
【図４３】図４２中のIVXIII-IVXIII線に沿う断面図。
【図４４】本発明の第１１実施の形態を示す超音波処置具を挿入部の一部のみを断面にして示した図。
【符号の説明】
【０２９８】
１…超音波処置具
４…挿入部
５…把持部
８…プローブ
９…送水吸引シース
１０１…流路
１０ｒ…流路
１２…流路
１３…送水送気ポート
１３ｒ…流路
１４…吸引ポート
１４ｒ…流路
２６…先端流路
２９…送水・送気装置
３０…吸引装置
３７…回動ノブ
３８…空間
４０…駆動軸チャンネル
４２…回動ノブ
４７…先端流路
２０１…超音波処置具
３０１…超音波処置具
３１２…流路
３２３…共用ポート
３２３ｒ…流路
５０１…超音波処置具
５０９…シース
５１２…流路

５１３…送水ポート
５１４…吸引ポート
５４３…先端開口部
６０１…超音波処置具
６０９…シース
６１２…流路
６４３…先端開口部
７０１…超音波処置具
７０９…シース
７１２…流路
７４３…先端開口部
８０１…超音波処置具
８０９…シース
８１２…流路
８１３…送水ポート
８１４…吸引ポート
９０１…超音波処置具
９０９…シース
９１２…流路
９１３…送水ポート
９４３…先端開口部
Ａ１…流路の断面積
Ａ２…開口部の断面積

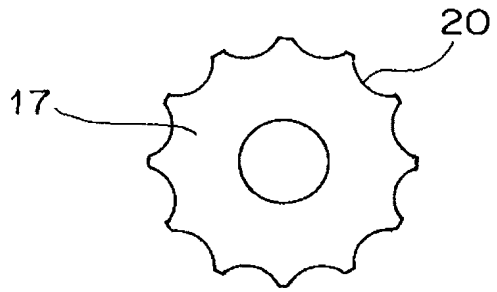
【図１】



【図２】



【図３】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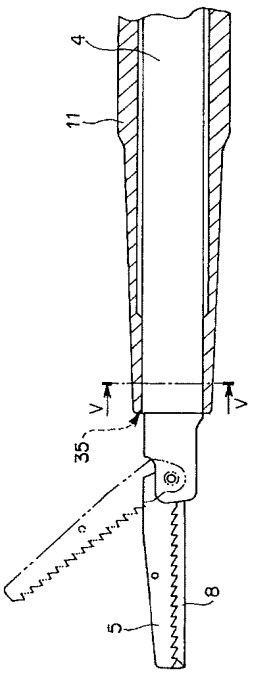
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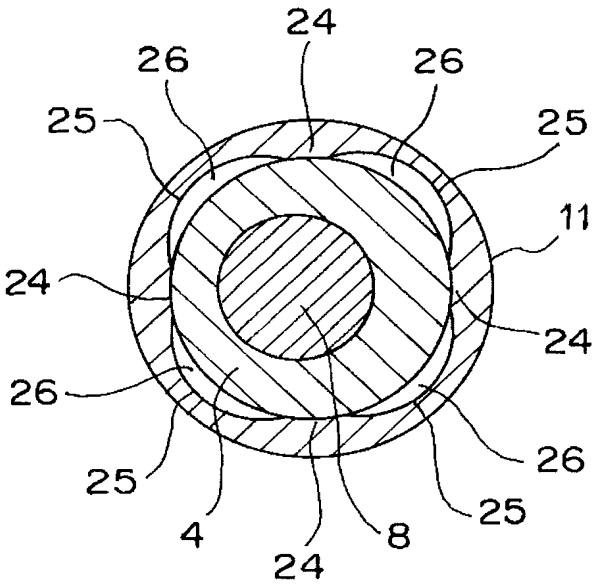
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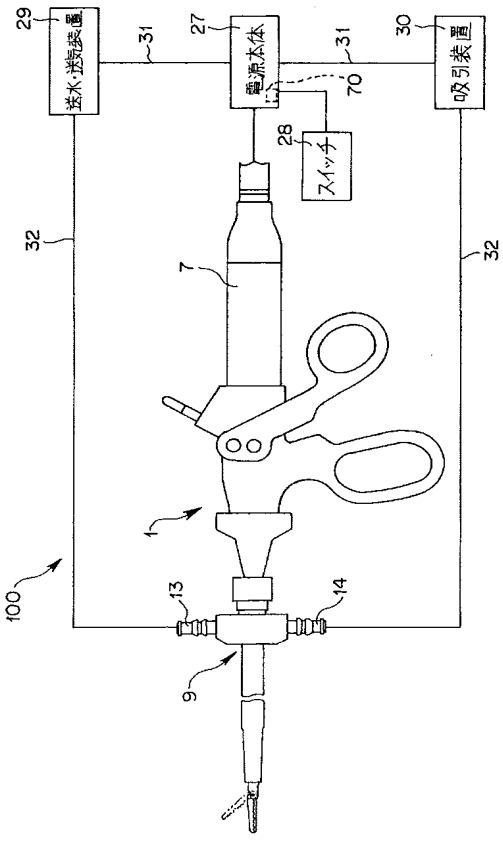
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送水・送気装置
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27
電源本体
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吸引装置
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スイッチ
32
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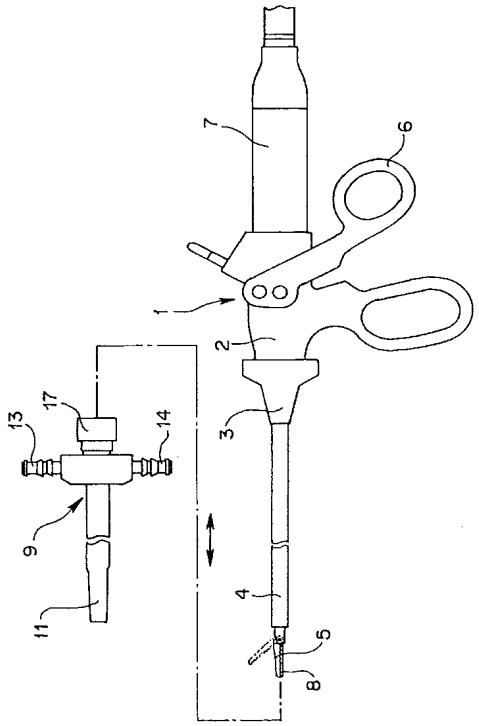
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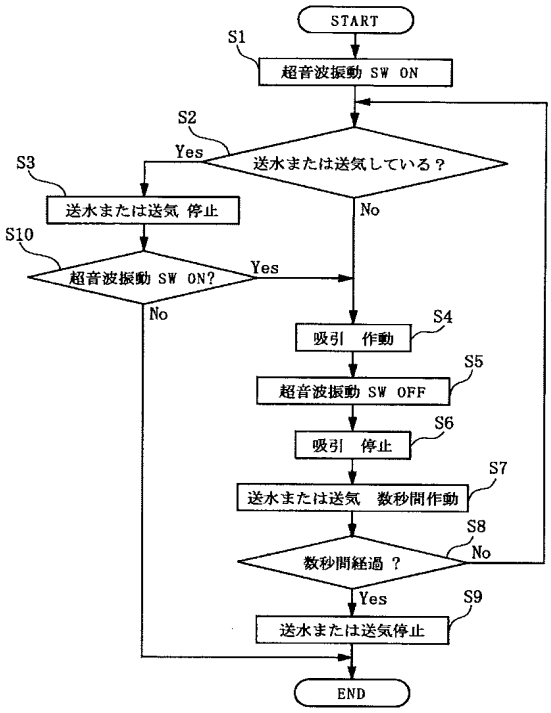
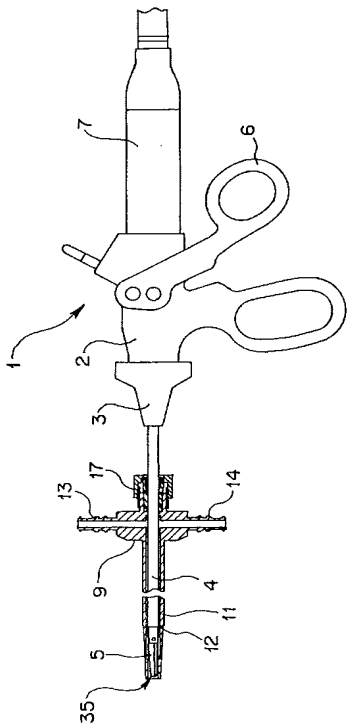

START
S1
超音波振動 SW ON
S2
Yes
送水または送気している？
No
S3
送水または送気 停止
S10
超音波振動 SW ON?
Yes
No
吸引 作動
S4
超音波振動 SW OFF
S5
吸引 停止
S6
送水または送気 数秒間作動
S7
数秒間経過 ？
S8
No
Yes
送水または送気停止
S9
END

【図９】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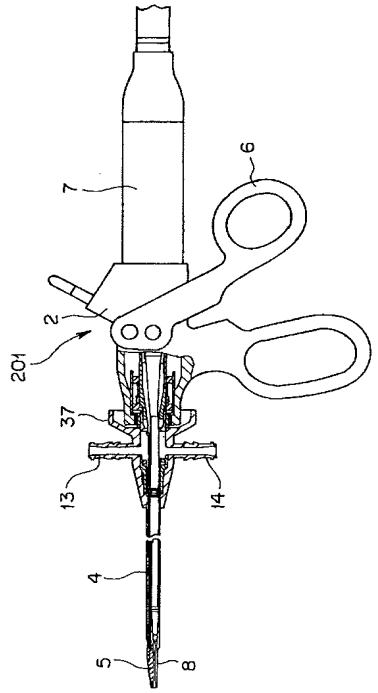
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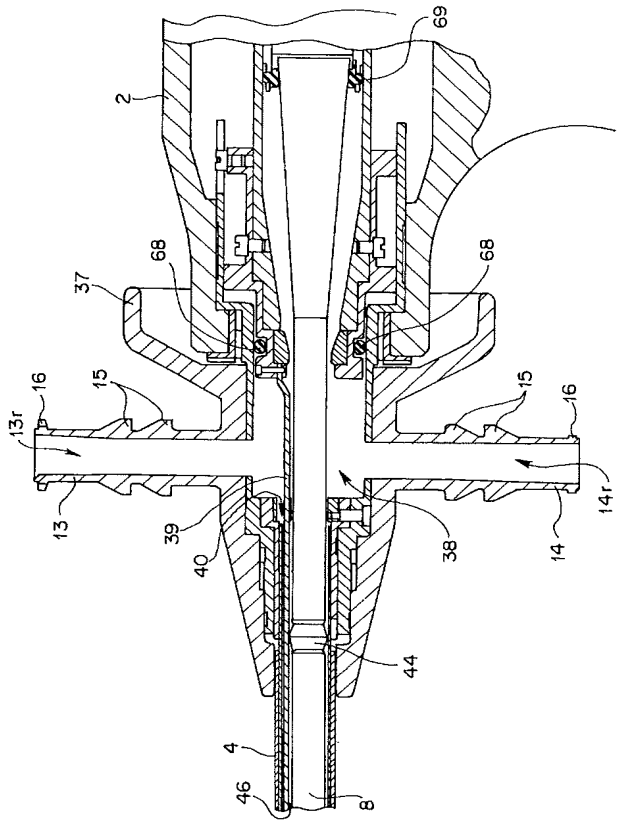

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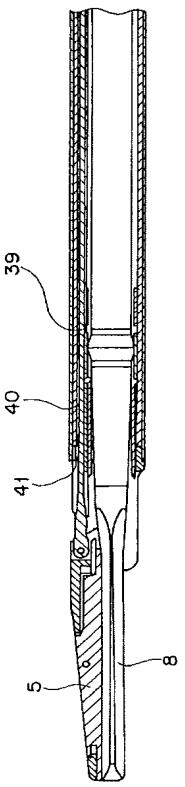

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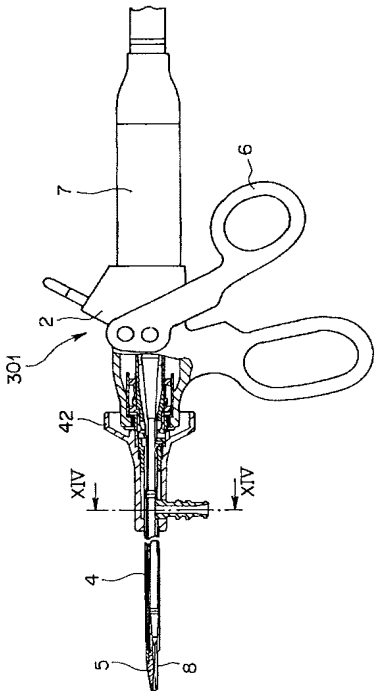

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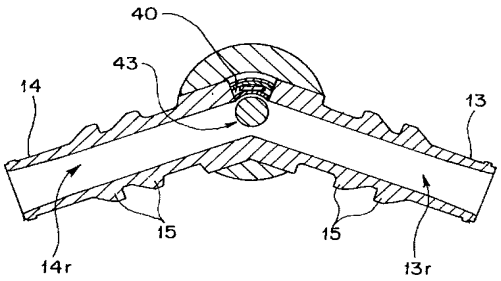

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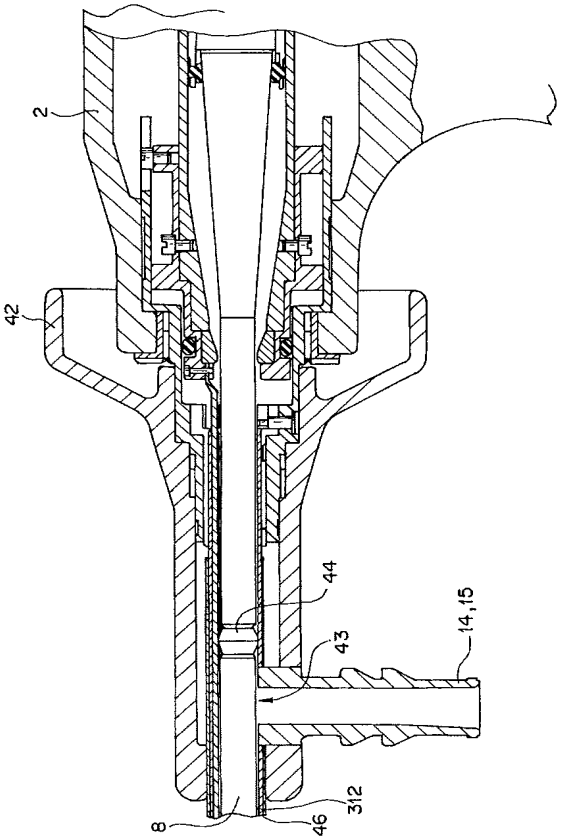

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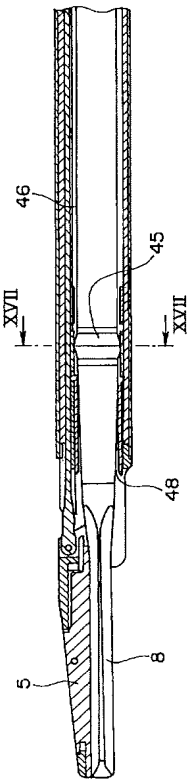

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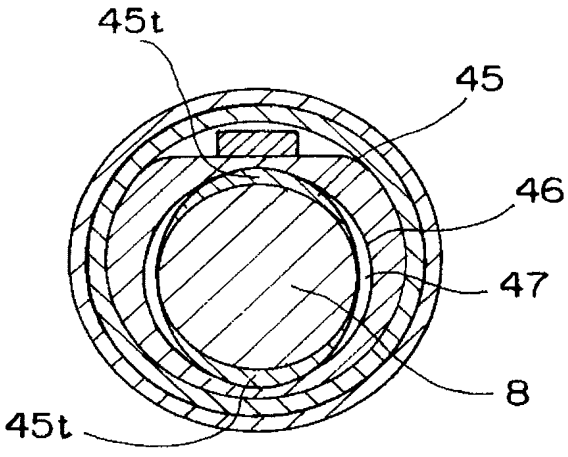

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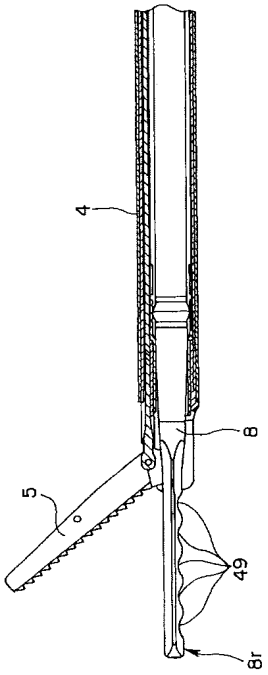

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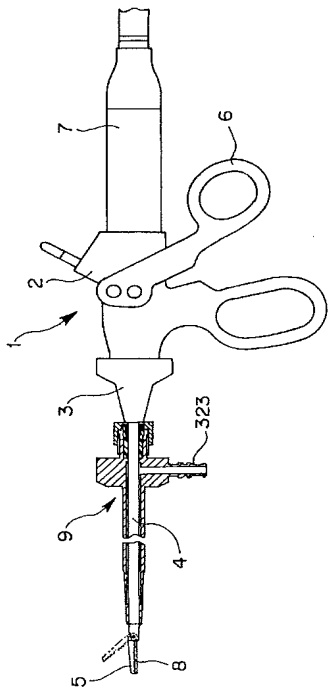

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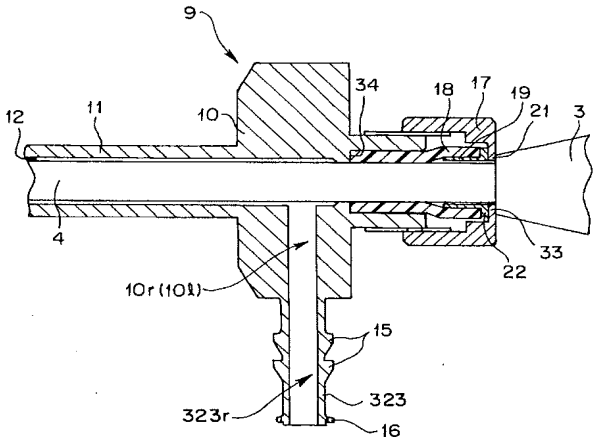

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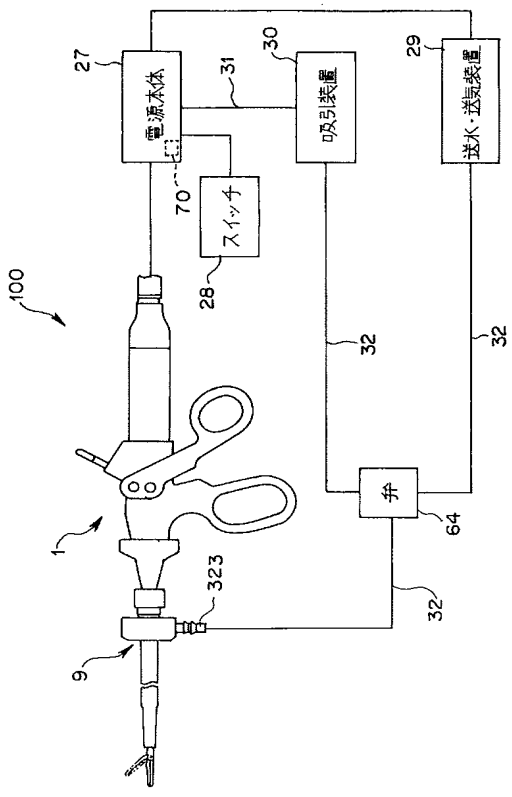

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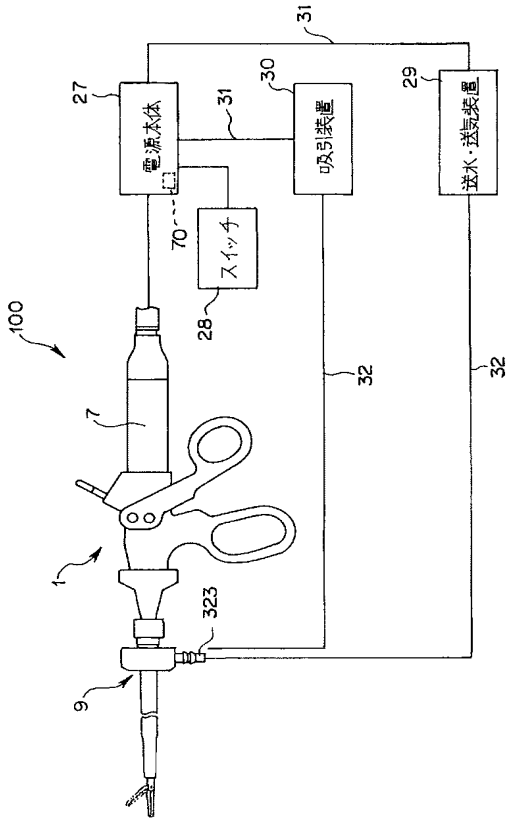

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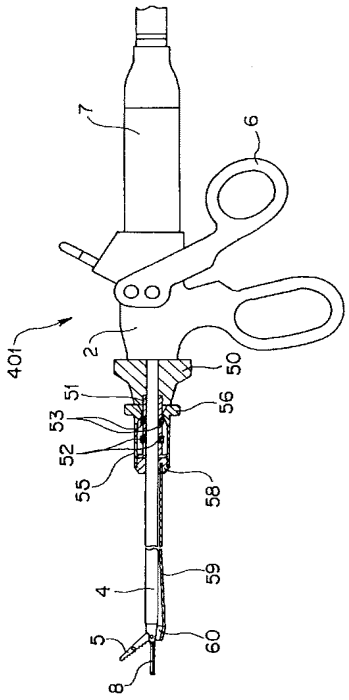

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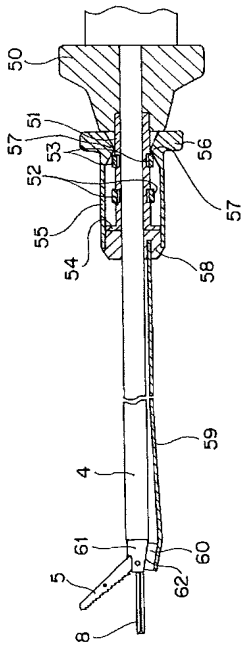

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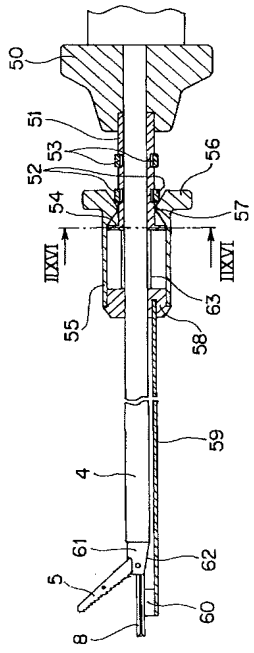

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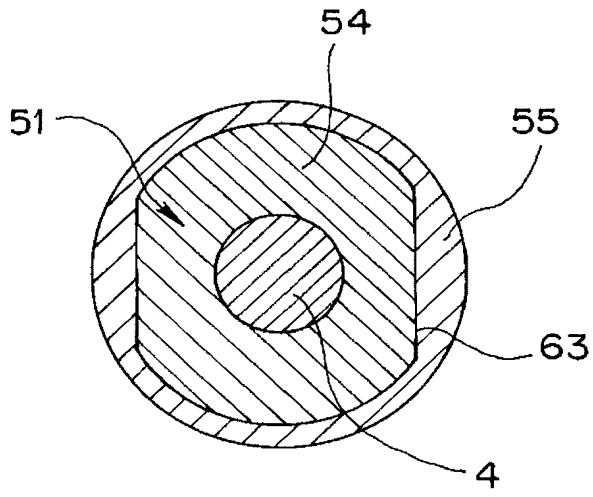

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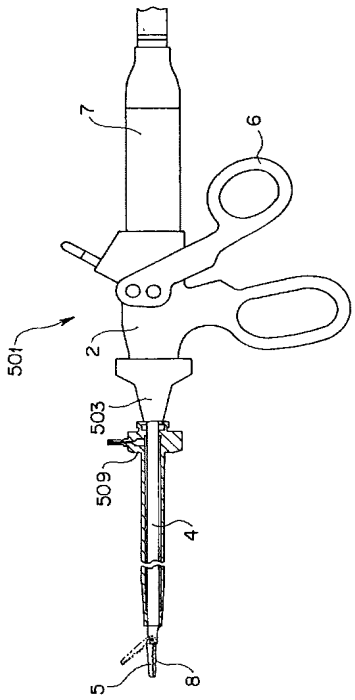

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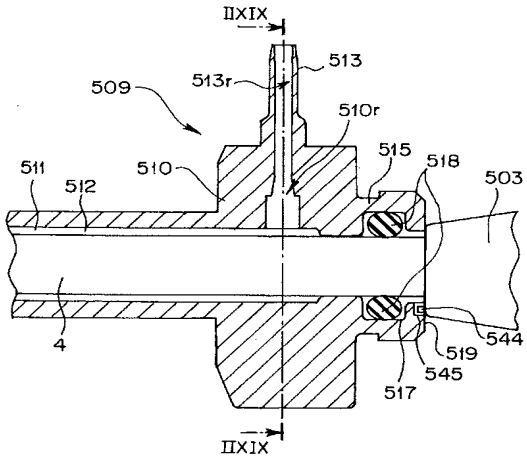

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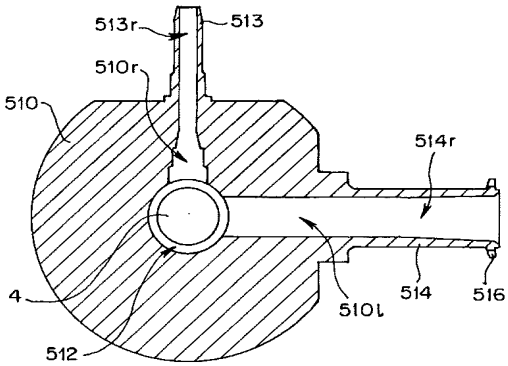

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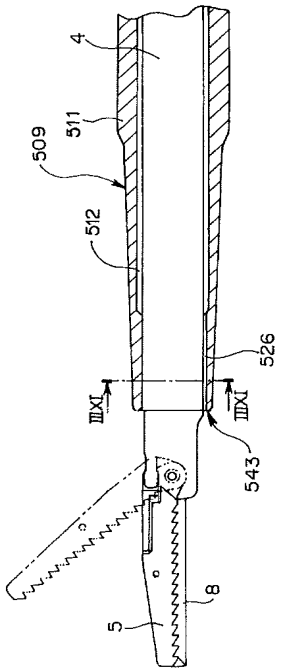

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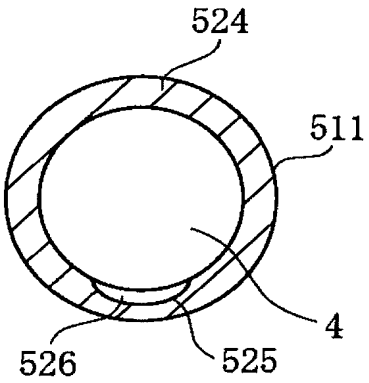

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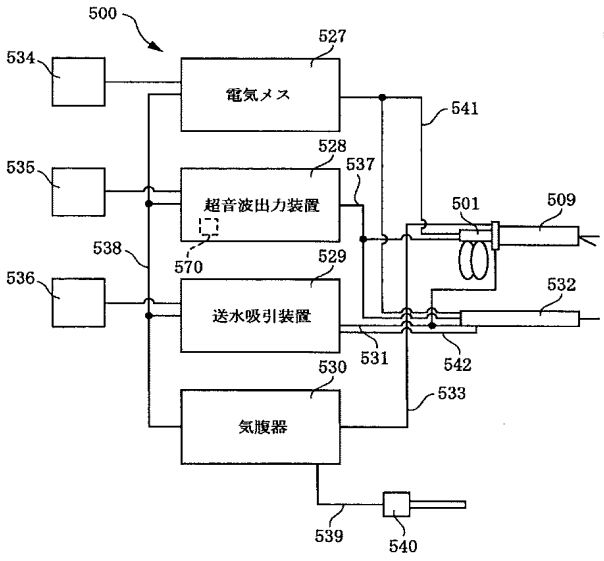

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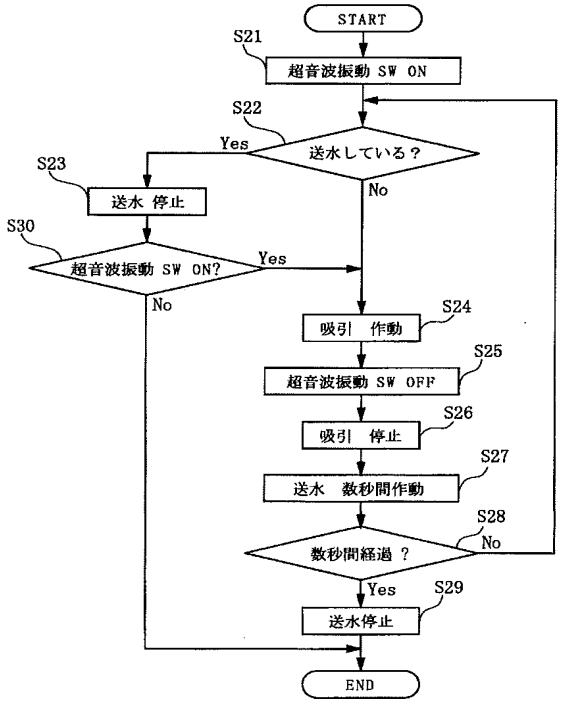

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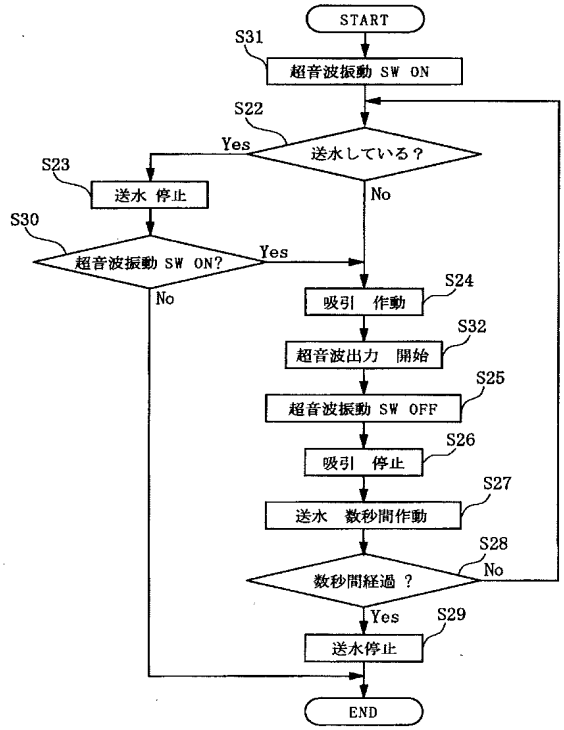

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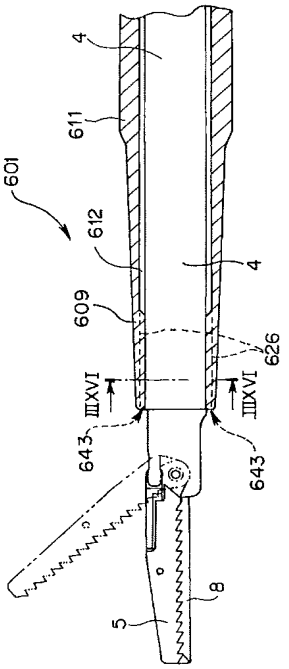

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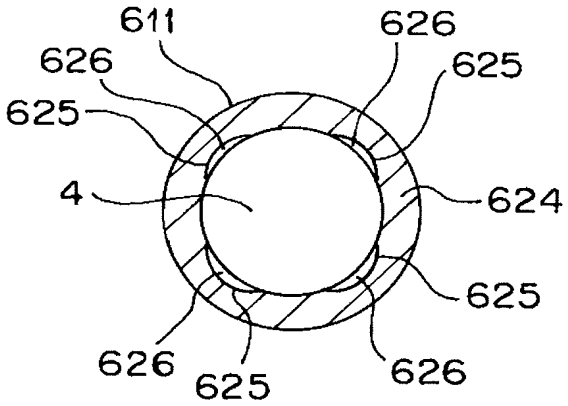

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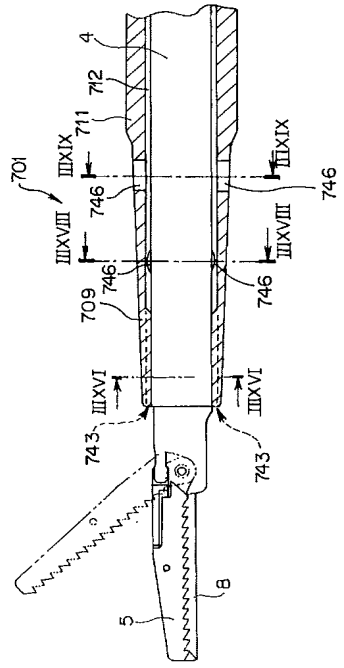

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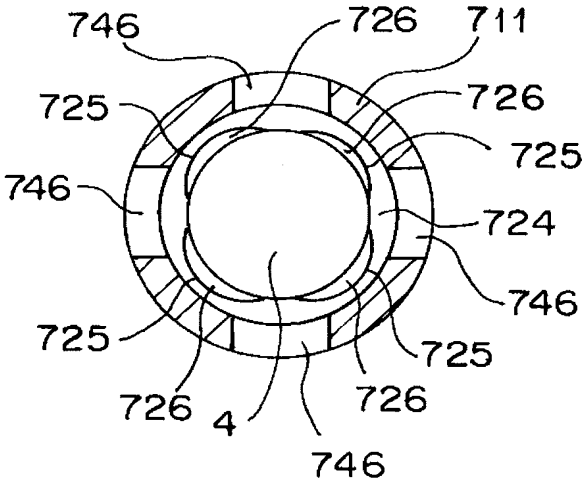

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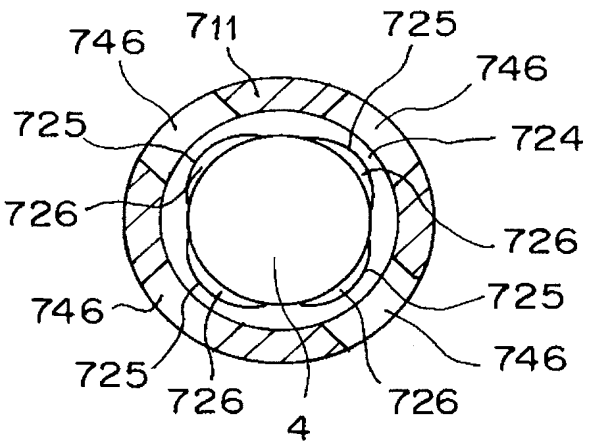

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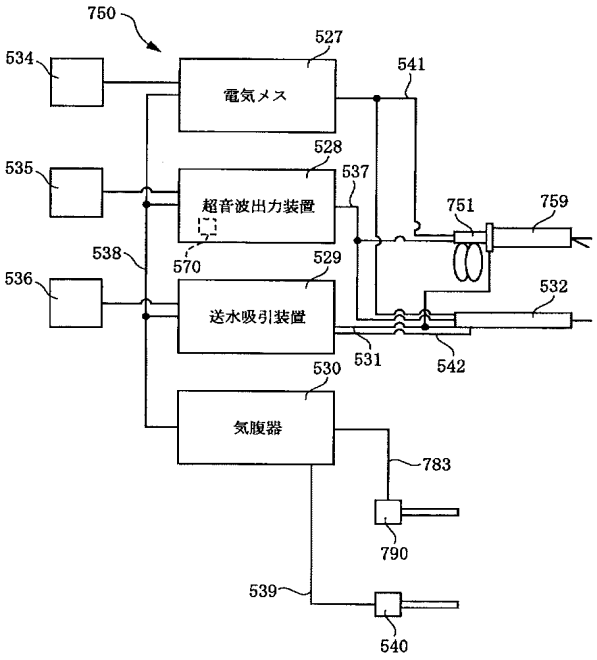

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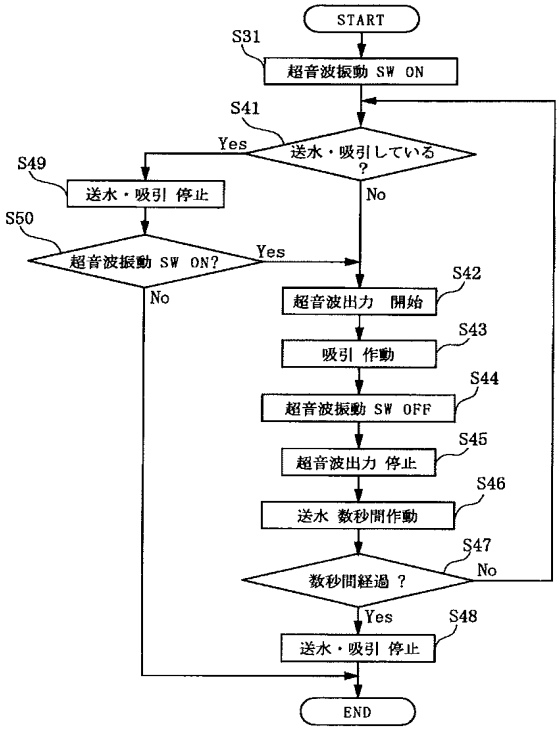

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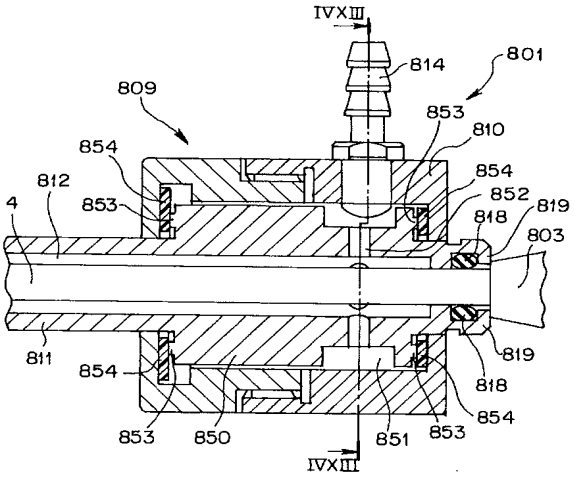

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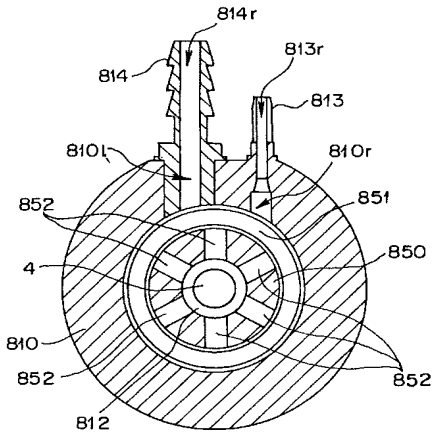
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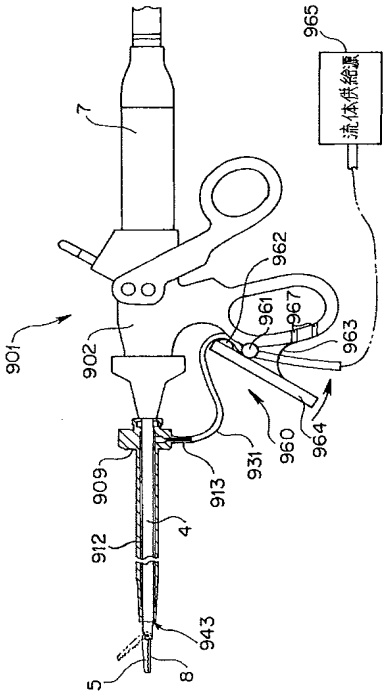
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フロントページの続き

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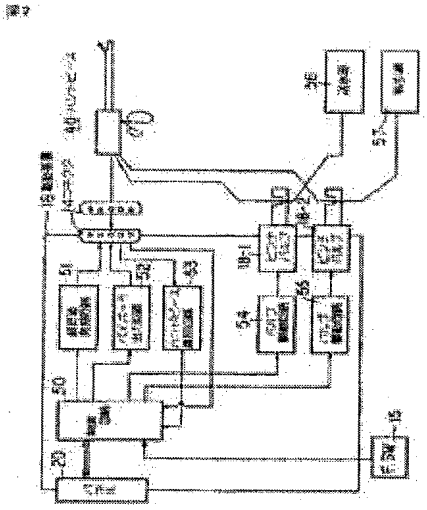
(71)Applicant : OLYMPUS CORP
(72)Inventor : SAKURAI TOMOHISA
MIYAZAWA TARO

(54) OPERATION SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an operation system by which an operator may optimally combine and execute functions required for a plurality of treatments the operator desires.
SOLUTION: The operation system includes a connector 14 to connect any of a plurality of handpieces 40 with treating parts for executing prescribed treatment on an organism, an ultrasonic oscillating circuit 51 to drive the treatment parts of the handpieces 40 connected to the connector 14 for executing treatment by ultrasonic vibration, a bipolar output circuit 52 to drive the treatment parts of the hand pieces 40 connected to the connector 14 for executing treatment by electric energy, a handpiece discriminating circuit 53 to discriminate the type of the handpiece 40 connected to the connector 14, and a control circuit 50 to change control methods for the ultrasonic oscillating circuit 51 and the bipolar output circuit 52 corresponding to the discriminating result by the handpiece discriminating circuit 53.



* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]
A connector for connecting any of two or more kinds of handpiece which has a treatment part for performing predetermined treatment to a living body they are,
A first circuit that performs a drive for performing first predetermined treatment to a treatment part of handpiece connected to the aforementioned connector,
A different second circuit from said first circuit for performing a drive for performing different second treatment from said first treatment to a treatment part of handpiece connected to the aforementioned connector,
A handpiece identification circuit which distinguishes a kind of the aforementioned handpiece connected to the aforementioned connector,
A control means which changes said 1st [the] and a control method of said second circuit according to a discriminated result by the aforementioned handpiece identification circuit,
A ****(ing) operation system.
[Claim 2]
A connector for connecting any of two or more kinds of handpiece which has a treatment part for performing predetermined treatment to a living body,
An ultrasonic output circuit which performs a drive for performing treatment by supersonic vibration to a treatment part of handpiece connected to the aforementioned connector,
An electrotome output circuit for performing a drive for performing treatment by electrical energy to a treatment part of handpiece connected to the aforementioned connector,
A handpiece identification circuit which distinguishes a kind of the aforementioned handpiece connected to the aforementioned connector,
A control means which changes a control method of the aforementioned ultrasonic output circuit and the aforementioned electrotome output circuit according to a discriminated result by the aforementioned handpiece identification circuit,
A ****(ing) operation system.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
The present invention relates to an operation system.
[Background of the Invention]
[0002]
Various kinds of operation systems are known from before, for example, supersonic vibration is used, There are ultrasonic coagulation / incision equipment which vibrates a treatment implement, and solidifies and cuts a body tissue open, an electrocautery apparatus which cauterizes a body tissue by the thermal action by high-frequency power, ultrasonic suction equipment which grinds and sucks an unnecessary body tissue, etc. Since the operation system of these various kinds has the strong point and a fault, respectively, undergoing an operation, combining each operation system suitably is proposed.
[0003]
For example, it is possible to stop the bleeding of the bleeding from the thin blood vessel at the time of the ultrasonic suction which was a fault of ultrasonic suction equipment by the combination of ultrasonic suction equipment and a mono- Poral electrocautery apparatus by the cautery operation by an electrocautery apparatus.
[0004]
However, when a mono- Poral electrocautery apparatus is used, there is that case where leak current occurs constitutionally, and there is a problem of doing damage by this in addition to the affected part.
[0005]
Then, International Publication WO 95/No. 17855 is disclosing the operation system which conquered the problem of leak current by combining ultrasonic suction equipment and a bipolar electrocautery apparatus.
[Description of the Invention]
[Problem to be solved by the invention]
[0006]
However, in the combination of ultrasonic suction equipment and a bipolar electrocautery apparatus, although the structure of a handpiece portion is disclosed in detail, above-mentioned International Publication WO 95/No. 17855, The driving source for driving ultrasonic suction equipment and the driving source for driving a bipolar electrocautery apparatus are constituted separately, and were left to control by each driving source about how the output of each equipment is made to act on a treatment part.
[0007]
It is combining organically at least two or more equipment outputs, and the place which the present invention is made paying attention to such problem, and is made into the purpose is one piece of equipment, and there is in providing the operation system which can be provided combining suitably a function required for two or more treatment which an operator wants to perform.
[Means for solving problem]
[0008]
In order to attain the above-mentioned purpose, the first mode of the present invention, The connector for connecting any of two or more kinds of handpiece which is operation systems and has a treatment part for performing predetermined treatment to a living body they are, The first circuit that performs the drive for performing first predetermined treatment to the treatment part of the handpiece connected to the aforementioned connector, A different second circuit from the above-mentioned first circuit for performing the drive for performing different second treatment from the above-mentioned first treatment to the treatment part of the handpiece connected to the aforementioned connector, It has a handpiece identification circuit which distinguishes the kind of the aforementioned handpiece connected to the aforementioned connector, and a control means which changes the 1st [above-mentioned] and the control method of the above-mentioned second circuit according to the discriminated result by the aforementioned handpiece identification circuit.
[0009]
The connector for connecting any of two or more kinds of handpiece which the second mode of the present invention is an operation system, and has a treatment part for performing predetermined treatment to a living body, The ultrasonic output circuit which performs the drive for performing treatment by supersonic vibration to the treatment part of the handpiece connected to the aforementioned connector, The electrotome output circuit for performing the drive for performing treatment by electrical energy to the treatment part of the handpiece connected to the aforementioned connector, It has a handpiece identification circuit which distinguishes the kind of the aforementioned handpiece connected to the aforementioned connector, and a control means which changes the control method of the aforementioned ultrasonic output circuit and the aforementioned electrotome output circuit according to the discriminated result by the aforementioned handpiece identification circuit.
[Effect of the Invention]
[0010]
Since at least two or more equipment outputs can be combined organically according to the present invention, it can provide with one piece of equipment, combining suitably a function required for two or more treatment which an operator wants to perform.
[Best Mode of Carrying Out the Invention]
[0011]

Hereafter, with reference to Drawings, the embodiment of the present invention is described in detail.
[0012]
Fig.1 is a shown figure the schematic structure of the operation system concerning a 1st embodiment of the present invention, and to the driving device 16, While the handpiece 40 is connected via the connector 21-2 and the ultrasonic code 14-2 via the connector 21-1 and the bipolar code 14-1, the foot switch (F. SW) 15 is connected removably. While having the panel 20 in which the button for assigning setting out of the size of the output of each equipment and the function of the foot switch (F. SW) 15 other than the electric power switch 22 to the front face of the driving device 16 was provided, The side surface provides, as projected in the pinch valve 18-1 and 18-2 from a side surface.
[0013]
The tube 14-3 was further connected to the handpiece 40, and this tube 14-3 has branched. As for the tube, while branching is connected to the physiological saline bottle 17 via the concave part of the pinch valve 18-1. The tube of another side is connected to the suction bottle 19 via the concave part of the pinch valve 18-2. This suction bottle 19 is connected to the wall suction part 23. The physiological saline is accumulated in the physiological saline bottle 17, and the physiological saline according to bolting of the pinch valve 18-1 is supplied to a treatment part via the tube 14-3. According to bolting of the pinch valve 18-2, an unnecessary organization is sucked and stored via the tube 14-3 by suction by the wall suction part 23 to the suction bottle 19 from a treatment part.
[0014]
The handpiece 40 has the handle 13 and serves as the handpiece main part 19 in which the ultrasonic transducer which is not illustrated was built from the probe 11 which transmits vibration of this ultrasonic transducer to the treatment part 8. This probe 11 has the suction path 11-1 over probe length, in order to carry out ultrasonic suction of the organization. The probe 11 is surrounded by the sheath 12 except for the tip. The grasping tools 10 called the jaw by which an opening-and-closing drive is carried out to the tip of the probe 11 to the treatment part 8 are provided. These grasping tools 10 are connected rotatable focusing on the rotation pin which is not illustrated to the point of the sheath 12. If the handle 13 is operated, the opening-and-closing drive of the grasping tools 10 will be carried out to the tip of the probe 11, a body tissue is put between the tip of the probe 11, and the grasping tools 10, and ultrasonic coagulation and incision are performed. The grasping tools 10 and the tip of the probe 11 consist of a bipolar current carrying part, and it also has a function as bipolar type electrotome.
[0015]
In order for Fig.2 to be a figure showing the first internal configuration of the driving device 16 shown in Fig.1 and to perform ultrasonic suction, ultrasonic coagulation, and incision,The ultrasonic oscillation circuit 51 for generating the electrical energy which vibrates an ultrasonic transducer, The bipolar output circuit 52 which generates the electrical energy supplied to the bipolar type electrotome, The handpiece identification circuit 53 which identifies which handpiece is connected via the connector 21-1 among two or more kinds of handpiece, The valve drive electronics 54 for driving the pinch valve 18-1, the valve drive electronics 55 for driving the pinch valve 18-2, and the control circuit 50 that controls operation of each above-mentioned circuit integrative are provided. 56 is a source of returning water and corresponds to the physiological saline bottle 17 of Fig.1. 57 is suction sources and corresponds to the wall suction part 23 of Fig.1.
[0016]
The control circuit 50 can distinguish the kind of handpiece connected to the driving device 16 by the handpiece identification circuit 53, can change a control parameter, and can change the control method of each energy source. By this, among cautery of the coagulotomy of the organization by supersonic vibration, ultrasonic suction, and the organization by the electrotome, at least two treatment can be switched simultaneous and can be performed. The coagulotomy of the organization by supersonic vibration as shows Fig.1 as a kind of handpiece, The thing of the type which can deal with cautery of ultrasonic suction and the organization by the electrotome simultaneously, and coagulotomy of the organization by supersonic vibration which is mentioned later, There is a thing of the type which can deal with cautery of the organization by the electrotome simultaneously, and the type which can deal with cautery of the organization by ultrasonic suction and the electrotome simultaneously.
[0017]
When the 1st pedal 15-1 (Fig.1) is operated, in the foot switch (F. SW) 15 Ultrasonic coagulation, If the ultrasonic oscillation circuit 51 drives and the 2nd pedal 15-2 (Fig.1) is operated in order to cut it open, the bipolar output circuit 52 will drive that electrical energy should be supplied to the electrotome.
[0018]
Fig.3 is a figure showing the second internal configuration of the driving device 16. Although the source of an oscillation for performing ultrasonic coagulation, incision, and ultrasonic suction, the source of bipolar one for conducting the operation by the electrotome, and the valve driving source were accommodated in one main part with the composition of the driving device 16 shown in the above-mentioned Fig.2, In this composition, constitute each driving source from a separate body, and it connects via the connection parts 156 and 157, While the main control part 50-1 provided by the main part for an ultrasonic output contacts between the control circuit 50-2 for a bipolar output, and the control circuit 50-3 for a valve drive, each driving source is controlled integrative. The panel 20-2 is used in order to perform various kinds of setting out, when conducting only the operation by the electrotome.
[0019]
Fig.4 is a time chart for describing the above-mentioned pinch valve 18-1 and the operation which drives 18-2 and controls water supply quantity and suction quantity.
[0020]
Although the fixed water-feeding pressure and suction force which are the source 56 of returning water and the suction sources 57 (Fig.2) have occurred, each pressure can be adjusted by driving each pinch valve 18-1 and 18-2, squeezing the tube 14-3, and changing the degree of opening and closing. That is, the pinch valve 18-1 and the degree of opening and closing of 18-2 are beforehand set up from the panel 20 based on the time rate (duty) of a pulse switching signal, and returning water or suction adjusted by operating the foot switch (F. SW) 15 can be performed.
[0021]
According to a 1st above-mentioned embodiment, it can provide with one piece of equipment by combining at least two or more circuit outputs, combining suitably a function required for two or more treatment which an operator wants to perform.
[0022]
Fig.5 is a figure showing the composition of the operation system concerning a 2nd embodiment of the present invention, the composition in the case of switching ultrasonic coagulation, and incision and the bipolar coagulation by the electrotome

simultaneous, and performing it is shown, and Fig.6 is a figure for describing the operation.
[0023]
The ultrasonic output circuit 60 which generates the electrical energy for vibrating the ultrasonic transducer 63 built in the handpiece 71 inside the driving device 70, The bipolar output circuit 61 which generates the electrical energy for supplying at the tip of the jaw 66 which constitutes a bipolar current carrying part and has a function as bipolar electrotome, and the probe 67, The panel 68 for setting up the size of allotment of the function of the foot switch (F. SW) 64 or the output of each equipment and the control circuit 62 which controls the output of the ultrasonic output circuit 60 and the output of the bipolar output circuit 61 based on operation of the foot switch (F. SW) 64 are provided.
[0024]
If an operator grabs the handle 65, the opening-and-closing drive of the jaw 66 will be carried out to the tip of the probe 67, and ultrasonic coagulation and incision are performed by putting a body tissue between the jaw 66 and the tip of the probe 67. Coagulation by the electrotome is performed by supplying electrical energy to the jaw 66 and the probe 67 from the bipolar output circuit 61.
[0025]
As shown in Fig.6, in performing ultrasonic incision, An ultrasonic output can cut it open simultaneously by operating the pedal 64-1 of the foot switch (F. SW) 64, and weakening a bipolar output for an ultrasonic output strongly, gathering the speed of organization conversion with a bipolar output. When performing ultrasonic coagulation, an ultrasonic output can only be weakly solidified by strengthening a bipolar output by operating the pedal 64-2 of the foot switch (F. SW) 64, without an organization sticking. Thus, although an organization can be slowly solidified and cut open at an appropriate temperature, It becomes possible to perform efficient treatment by combining the electrocautery apparatus in which cautery temperature has the fault that an organization will be cauterized rapidly highly although treatment speed is quick with ultrasonic coagulotomy equipment with the fault that treatment speed is comparatively slow.
[0026]
Fig.7 is a shown figure the composition inside the handpiece of an ultrasonic surgery apparatus with ultrasonic suction and the function of the bipolar electrotome in a 3rd embodiment of the present invention, and The ultrasonic transducer 103, The probe 100 connected to this ultrasonic transducer 103, and the insulating layer 101 laminated around probe 100 point at least, It has the conductive layer 102 by the laminating formation by which adjoined the upper layer and the high frequency insulation was carried out from the probe 100, and the bipolar electrotome is constituted between the conductive layers 102 with the probe 100. The insulating layer 101 is formed by coating of insulating ceramics or an insulating plastic. The operation switch mentioned later is provided by handpiece outside.
[0027]
Fig.8 is an appearance perspective view of the handpiece in a 3rd embodiment, and the handpiece main part 30 which built in the sheath 32 which surrounds the probe 100 shown in Fig.7, and the ultrasonic transducer 103 shown in Fig.7 is illustrated.From this handpiece main part 30, the bipolar code 34-1, the ultrasonic code 34-2, and the tube 34-3 are pulled out, and these are connected to the drive circuit mentioned later. The operation switch 33-1 which has a function equivalent to a foot switch (F. SW) in the handpiece main part 30, and 33-2 are provided.
[0028]
Fig.9 is an entire configuration figure of the ultrasonic surgery apparatus which added the circuit configuration of the body part to the handpiece of composition of having described above. The bipolar output circuit 105 where the driving part 110 generates the electrical energy supplied to the bipolar electrotome, The ultrasonic oscillation circuit 106 which generates the electrical energy for vibrating the ultrasonic transducer 103, The panel 108 for assigning setting out of the control circuit 107 which controls these two circuits based on the operation switch 33-1 and the signal from 33-2, and the output of each equipment, and the operation switch 33-1 and the function of 33-2 is provided.
[0029]
When the operation switch 33-1 is operated, the ultrasonic oscillation circuit 106 is turned on by the control circuit 107, by this, electrical energy is supplied to the ultrasonic transducer 103, the ultrasonic transducer 103 vibrates, and ultrasonic suction becomes possible. When the operation switch 33-2 is operated, the bipolar output circuit 105 by the control circuit 107 is turned on, electrical energy is supplied to the bipolar electrotome by this, and cautery treatment is attained by it.
[0030]
As it is indicated in Fig.10 as the above-mentioned electrode 104 and the conductive layer 102, in near the paragraph of vibration of the ultrasonic transducer 103, it is in contact. Fig.10 (A) shows the contact state in case the electrode 104 consists of electrical conductive gum (O ring), and Fig.10 (B) shows the contact state in case the electrode 104 consists of spring contacts.
[0031]
Since according to a 3rd above-mentioned embodiment it does not care about a treatment part since a bipolar output can be applied to an ultrasonic treatment device, and a counter electrode plate also becomes unnecessary, a safe and user-friendly operation system can be provided.
[0032]
Fig.11 is a shown figure the modification of a 3rd embodiment of the above-mentioned present invention, and inside the handpiece of an ultrasonic surgery apparatus, The ultrasonic transducer 103 and the probe 100 connected to this ultrasonic transducer 103, It has the conductive layer 102-1 by which plural-laminates formation was carried out, 102-2 and the insulating layer 101-1, and 101-2 around this probe 100, On both sides of the insulating layer 101-1 and 101-2, the high frequency insulation is carried out, respectively, and the conductive layer 102-1 and 102-2 constitute the bipolar electrotome between the conductive layer 102-1 and 102-2. Fig.12 shows the cross sectional view of Fig.11.
[0033]
Fig.13 is an entire configuration figure of the ultrasonic surgery apparatus which added the circuit configuration of the driving part to the handpiece of composition of having described above. Since this composition, the operation, and the effect are completely the same as that of Fig.9, a description is omitted.
[0034]
Here, as it is indicated in Fig.14 as the above-mentioned electrode 104, the conductive layer 102-1, and 102-2, in near the paragraph of vibration of the ultrasonic transducer 103, it is in contact. Here, the contact state in case the electrode 104 consists of electrical conductive gum (O ring) is shown.
[0035]

Fig.15 is a figure showing the composition of the ultrasonic surgery apparatus concerning a 4th embodiment of the present invention. As shown in Fig.15, the handpiece 210 comprises the probe 200 which has the suction path 200-1, the ultrasonic transducer 201, and the built-in suction pump 202. The suction pump 202 is connected to the suction thing storage container 204 via the suction tube 203 extended to outside from the inside of the handpiece 210. The body part 211 is provided with the following.
Ultrasonic oscillation circuit 205.
Control circuit 206.
Pinch valve 207.
Navigational panel 208.
The foot switch (F. SW) 209 is connected to the control circuit 206.
[0036]
In the above-mentioned composition, if an operator operates and turns on the ultrasonic output pedal 209-2 of the foot switch (F. SW) 209, the control circuit 206 will respond to this and will vibrate the ultrasonic transducer 201. This vibration is transmited at probe 200 tip. If the suction pedal 209-1 is operated and turned on in this state, the control circuit 206 will be controlled to open the pinch valve 207 while responding to this and operating the suction pump 202. The unnecessary organization at probe 200 tip passes the probe 200 and the suction tube 203, and is sucked and stored in the suction thing storage container 204 by this. And if the suction pedal 209-1 is turned off, while the suction pump 202 will be suspended, the pinch valve 207 closes and suctioning operation is suspended.
[0037]
Here, as it is indicated in Fig.14 as the above-mentioned electrode 104, the conductive layer 102-1, and 102-2, in near the paragraph of vibration of the ultrasonic transducer 103, it is in contact. Here, the contact state in case the electrode 104 consists of electrical conductive gum (O ring) is shown.
[0038]
According to a 4th above-mentioned embodiment, the suction force stable since the suction force was used at the both ends of the suction tube 203 by providing the suction pump 202 in the handpiece 210 is acquired. Since the influence of the suction-force deterioration by line resistance can be suppressed to the minimum, an organization can be sucked stably.
[0039]
Fig.16 is a figure showing the above-mentioned modification of a 4th embodiment. Although the fundamental composition and its operation are the same as that of Fig.15, it differs here in that the suction pump 202 in the handpiece 210 is connected to the external suction means 212 via the suction tube 203 and the suction thing storage container 204.
[0040]
Since the suction force of the external suction means 212 is kept constant according to such composition, it is effective in a time lag until suction force occurs at probe 200 tip decreasing after operation of the suction pedal 209-1.
[0041]
Fig.17 is a figure showing the further modification of a 4th above-mentioned embodiment. Although the fundamental composition and its operation are the same as that of Fig.15, In this modification, the path of the suction tube 203-1 which ties the suction pump 202 and the suction thing storage container 204 is thin, and it differs in that the path of the suction tube 203-3 which ties the external suction means 212 and the suction thing storage container 204 is formed thickly. That is, it makes a path thin so that it may improve operativity, since the suction tube 203-1 by the side of the handpiece 210 is related to operativity, and in order to suppress pressure loss to the minimum, it makes the diameter of a tube of other portions the large diameter. In this modification, the suction thing storage container 204, When a suction thing is stored to the limit, it comprises the disposable container 204-1 which can be removed and thrown away, and the container 204-2 for holding this, and the two containers 204-1 and 204-2 are connected with the suction tube 203-2 of the large diameter.
[0042]
Invention of the following composition is included in the above-mentioned specific embodiment.
[0043]
1.
Handpiece which has the treatment part provided with the current carrying part of at least 2 poles while the vibrational energy from an ultrasonic transducer and this ultrasonic transducer is transmited and carries out supersonic vibration,
Returning water and the suction means which performs suction from a treatment part while performing returning water to a treatment part via this handpiece,
The ultrasonic output circuit which generates the electrical energy for vibrating the aforementioned ultrasonic transducer, and is supplied to the aforementioned ultrasonic transducer, A driving device which has a control means which controls the electrotome output circuit which generates the electrical energy for cauterizing an organization and is supplied to the current carrying part of at least 2 above-mentioned poles, aforementioned returning water and suction means, the aforementioned ultrasonic output circuit, and the aforementioned electrotome output circuit integrative,
It provides,
An operation system characterized by the coagulotomy of the organization by supersonic vibration, ultrasonic suction, and switching at least two treatment simultaneous and performing it among cautery of the organization by the electrotome based on control of the aforementioned control means.
[0044]
1-1.
The aforementioned returning water and suction means of 1. contain the pinch valve for opening and closing the aforementioned tube, in order to control the water supply quantity to the treatment part through a tube, and the suction quantity from the treatment part through a tube.
[0045]
1-2.
The aforementioned pinch valve of 1.1 controls water supply quantity and suction quantity by changing the ratio of the opening-and-closing time which opens and closes the aforementioned tube.
[0046]
1-3.
The aforementioned returning water and suction means of 1. are constituted as integrally as the aforementioned driving device.

[0047]
1-4.
The aforementioned control means of 1. switches the control method of each energy source according to the kind of handpiece connected to the aforementioned driving device.
[0048]
1-5.
The aforementioned ultrasonic output circuit of 1., the aforementioned electrotome output circuit, and aforementioned returning water and suction means comprise a separate body, and for these each means, a control circuit is provided, and while one of the control circuits of each means contacts other control circuits as a main control circuit, they control the whole.
[0049]
1-6.
The aforementioned control means of 1. has a mode in which a measure is taken by giving priority to specific treatment among cautery of the organization by the coagulation of the organization by supersonic vibration, incision, ultrasonic suction, and the electrotome.
[0050]
2.
Handpiece containing the conductive operation component which an ultrasonic transducer, the probe which transmits the supersonic vibration by this ultrasonic transducer to a treatment part, and this probe are insulated electrically, is arranged, and acts on a treatment part,
A source of an ultrasonic oscillation, a source of a bipolar electrotome oscillation, and a driving device that includes a control means in order to supply simultaneously the oscillation output of the source of these both oscillations to the aforementioned probe and an operation component with the combination pattern which consists of the timing and size,
An operation system to provide.
[0051]
2-1.
It has a setting-out means for setting up the aforementioned combination pattern of 2. arbitrarily.
[0052]
3.
Vibrator,
The probe connected to this vibrator,
The insulating layer laminated around the end-of-the-probe part at least,
The conductive layer by the laminating formation by which adjoined the upper layer and the high frequency insulation was carried out from the probe,
It provides,
An ultrasonic surgery apparatus constituting the bipolar electrotome between the aforementioned probe and the aforementioned conductive layer.
[0053]
3-1.
Having two or more conductive layers and insulating layers which were laminated around the aforementioned probe of 3., on both sides of the aforementioned insulating layer, the high frequency insulation is carried out, respectively, and the aforementioned conductive layer constitutes the bipolar electrotome between the aforementioned conductive layers.
[0054]
3-2.
The aforementioned insulating layer of 3. is formed by coating of insulating ceramics.
[0055]
3-3.
The aforementioned insulating layer of 3. is formed by coating of the insulating plastic.
[0056]
4.
Vibrator
The probe which has a suction path,
Built-in suction pump,
An ultrasonic surgery apparatus having the handpiece to provide.
[0057]
4-1.
The built-in suction pump and external suction means in the aforementioned handpiece of 4. are connected via the suction tube and the suction thing storage container.
[0058]
4-2.
4. The path of the suction tube which ties the aforementioned external suction means and a suction thing storage container is formed more thickly than the path of the suction tube which ties a built-in suction pump and a suction thing storage container.
[Brief Description of the Drawings]
[0059]
[Drawing 1]It is a figure showing the schematic structure of the operation system concerning a 1st embodiment of the present invention.
[Drawing 2]It is a figure showing the first internal configuration of the driving device shown in Fig.1.
[Drawing 3]It is a figure showing the second internal configuration of the driving device shown in Fig.1.
[Drawing 4]It is a time chart for describing the operation which drives a pinch valve and controls water supply quantity and suction quantity.
[Drawing 5]It is a figure showing the composition of the operation system concerning a 2nd embodiment of the present invention.

[Drawing 6]It is a figure for describing an operation of a 2nd embodiment.

[Drawing 7]It is a figure showing the composition inside the handpiece of a 3rd embodiment of the present invention.
[Drawing 8]It is an appearance perspective view of the handpiece concerning a 3rd embodiment of the present invention.
[Drawing 9]It is an entire configuration figure of the ultrasonic surgery apparatus which added the circuit configuration of the body part to the handpiece in a 3rd embodiment.
[Drawing 10]In a 3rd embodiment, it is a figure for describing the contact state of an electrode and a conductive layer.
[Drawing 11]It is a figure showing the modification of a 3rd embodiment of the present invention.
[Drawing 12]The cross sectional view of the handpiece shown in Fig.11 is shown.
[Drawing 13]It is an entire configuration figure of the ultrasonic surgery apparatus which added the circuit configuration of the body part to the handpiece in the modification of a 3rd embodiment.
[Drawing 14]In the modification of a 3rd embodiment, it is a figure for describing the contact state of an electrode and a conductive layer.
[Drawing 15]It is a figure showing the composition of the ultrasonic surgery apparatus concerning a 4th embodiment of the present invention.
[Drawing 16]It is a figure showing the composition of the modification of a 4th embodiment of the present invention.
[Drawing 17]It is a figure showing the composition of the further modification of a 4th embodiment of the present invention.
[Explanations of letters or numerals]
[0060]
10 Grasping tools (jaw)
11 Probe
12 Sheath
13 Handle
14-1 Bipolar code
14-2 Ultrasonic code
14-3 Tube
15 Foot switch (F. SW)
16 Driving device
17 Physiological saline bottle
18 Pinch valve
19 Handpiece main part
23 Wall suction part
40 Handpiece

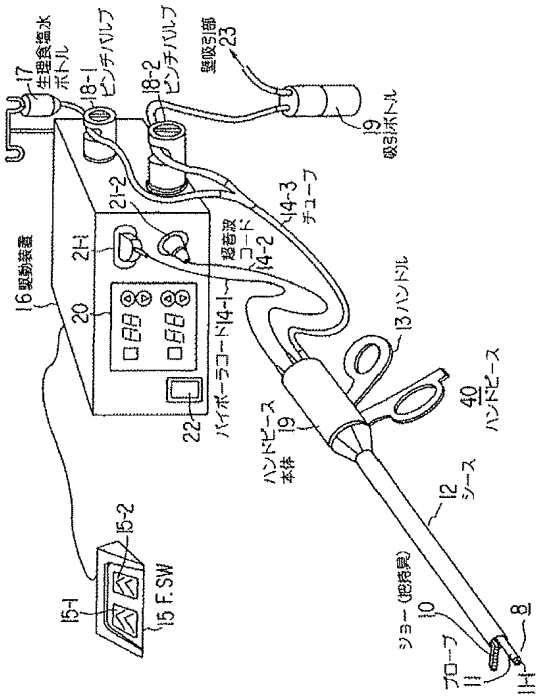
[Translation done.]

* NOTICES *

DRAWINGS

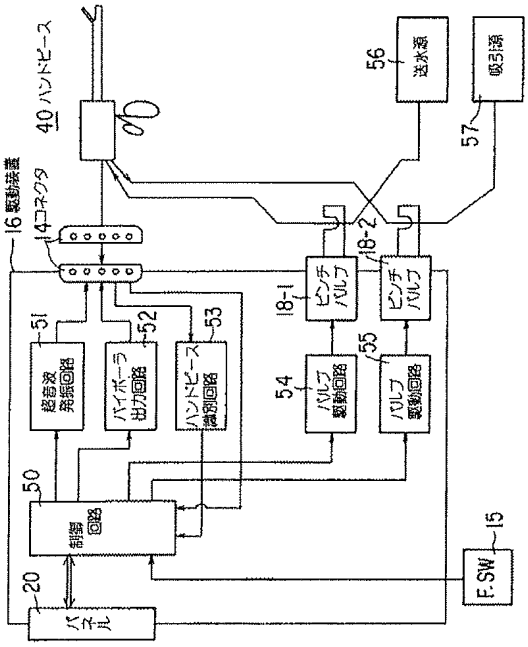
[Drawing 1]

図 1



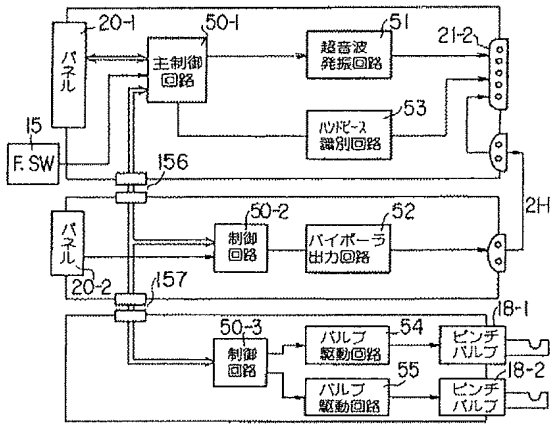
[Drawing 2]

図 2



[Drawing 3]

図 3



[Drawing 4]

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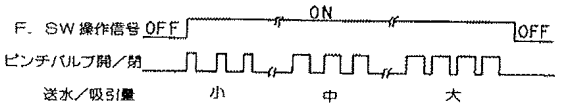
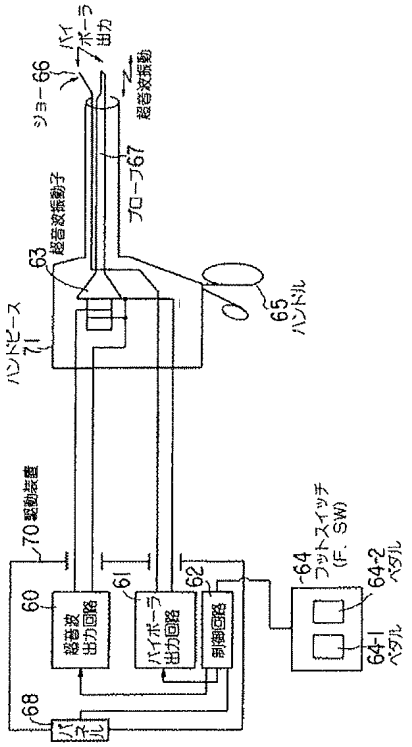


[Drawing 5]

図５



[Drawing 6]

図６

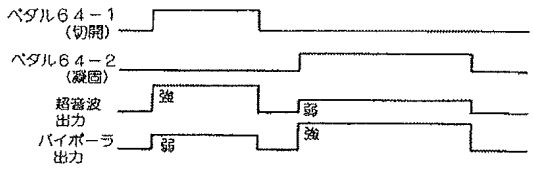


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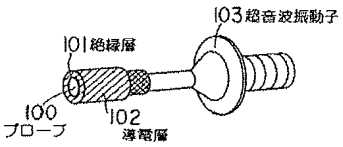
図 7



[Drawing 8]

図 8

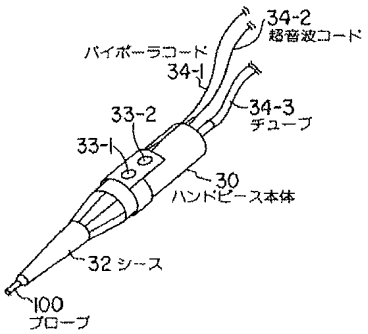


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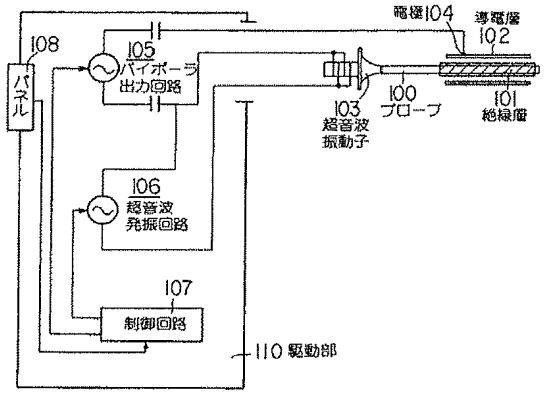
図 9



[Drawing 10]

図 10

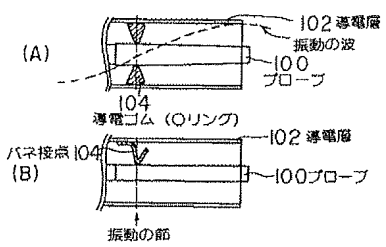


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図 11

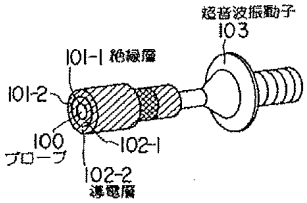

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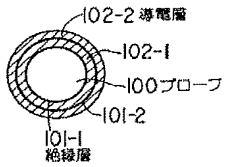
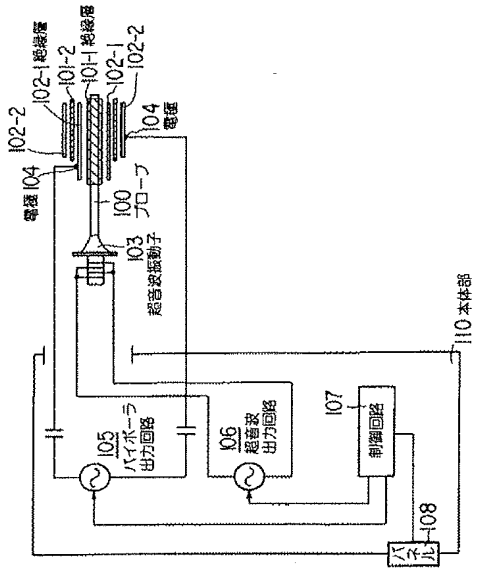
図 12



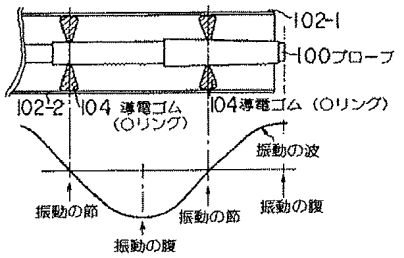
[Drawing 13]

図 13



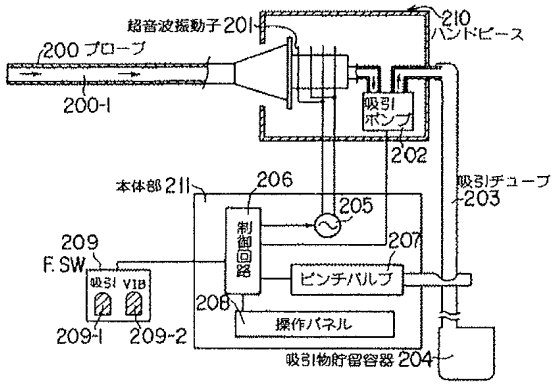
[Drawing 14]

図 14



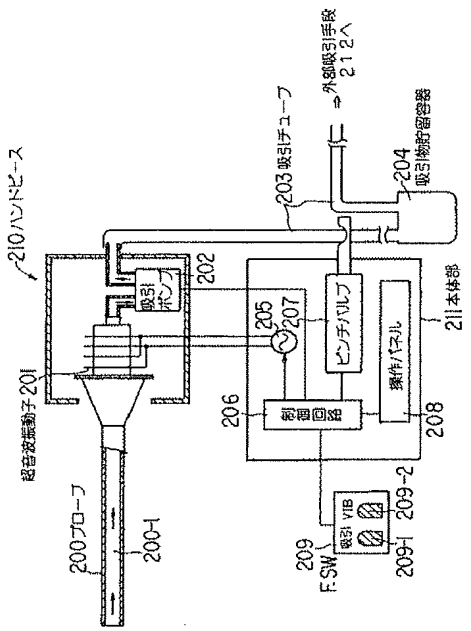
[Drawing 15]

図 15



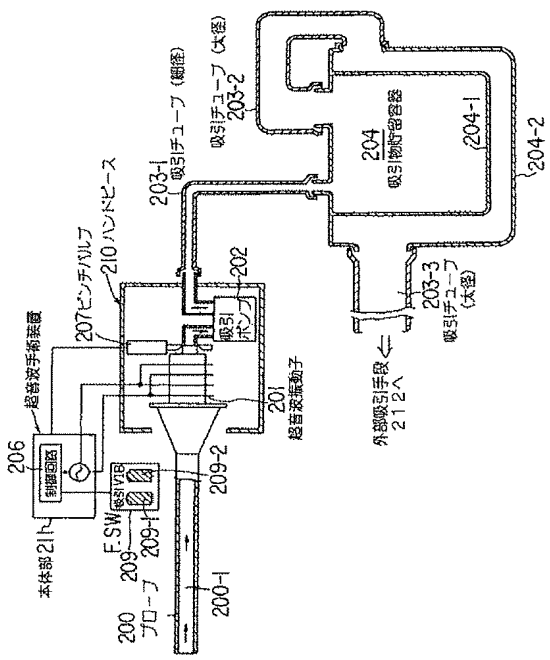
[Drawing 16]

図 16



[Drawing 17]

図 17



[Translation done.]

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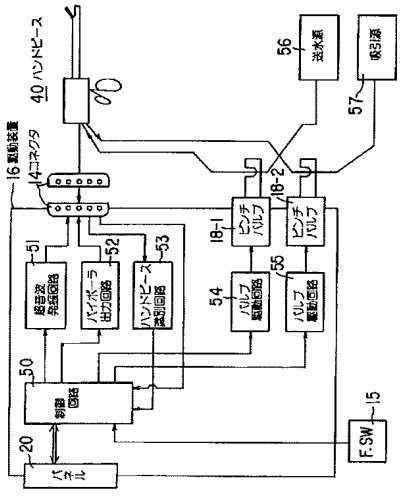
最終頁に続く

(54)【発明の名称】手術装置

(57)【要約】
【課題】１つの装置で、操作者が行ないたい複数の処置に必要な機能を適宜組み合わせて提供すること。
【解決手段】手術装置であって、生体に対して所定の処置を行うための処置部を有する、複数種類のハンドピース４０の何れを接続するためのコネクタ１４と、コネクタ１４に接続されたハンドピース４０の処置部に対して超音波振動による処置を行うための駆動を行う超音波発振回路５１と、コネクタ１４に接続されたハンドピース４０の処置部に対して電気エネルギによる処置を行うための駆動を行うためのバイポーラ出力回路５２と、コネクタ１４に接続されたハンドピース４０の種類を判別するハンドピース識別回路５３と、ハンドピース識別回路５３による識別結果に応じて超音波発振回路５１とバイポーラ出力回路５２の制御方法を変更する制御回路５０とを有する。
【選択図】　図２

図２



【特許請求の範囲】
【請求項１】
生体に対して所定の処置を行うための処置部を有する、複数種類のハンドピースの何れかを接続するためのコネクタと、
前記コネクタに接続されたハンドピースの処置部に対して所定の第１の処置を行うための駆動を行う第１の回路と、
前記コネクタに接続されたハンドピースの処置部に対して前記第１の処置とは異なる第２の処置を行うための駆動を行うための、前記第１の回路とは異なる第２の回路と、
前記コネクタに接続された前記ハンドピースの種類を判別するハンドピース識別回路と、
前記ハンドピース識別回路による識別結果に応じて前記第１及び前記第２の回路の制御方法を変更する制御手段と、
を有することを特徴とする手術装置。
【請求項２】
生体に対して所定の処置を行うための処置部を有する、複数種類のハンドピースの何れを接続するためのコネクタと、
前記コネクタに接続されたハンドピースの処置部に対して超音波振動による処置を行うための駆動を行う超音波出力回路と、
前記コネクタに接続されたハンドピースの処置部に対して電気エネルギによる処置を行うための駆動を行うための電気メス出力回路と、
前記コネクタに接続された前記ハンドピースの種類を判別するハンドピース識別回路と、
前記ハンドピース識別回路による識別結果に応じて前記超音波出力回路と前記電気メス出力回路の制御方法を変更する制御手段と、
を有することを特徴とする手術装置。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は手術装置に関するものである。
【背景技術】
【０００２】
従来より各種の手術装置が知られており、例えば、超音波振動を利用し、処置具を振動させて生体組織を凝固、切開する超音波凝固・切開装置や、高周波電力による熱作用で生体組織の焼灼を行なう電気メス装置や、不要な生体組織を粉砕して吸引する超音波吸引装置などがある。これら各種の手術装置にはそれぞれ長所、欠点があるので、各々の手術装置を適宜組み合わせて手術を行なうことが提案されている。
【０００３】
例えば、超音波吸引装置とモノポーラ電気メス装置との組み合せによって、超音波吸引装置の欠点であった超音波吸引時における細い血管からの出血を電気メス装置による焼灼作用により止血することが可能である。
【０００４】
ところが、モノポーラ電気メス装置を使用した場合には、その構成上、もれ電流が発生する場合があり、これによって患部以外に損傷を与えてしまうという問題がある。
【０００５】
そこで、国際公開ＷＯ９５／１７８５５号は、超音波吸引装置とバイポーラ電気メス装置とを組み合せることにより、もれ電流の問題を克服した手術装置を開示している。
【発明の開示】
【発明が解決しようとする課題】
【０００６】
しかしながら、上記した国際公開ＷＯ９５／１７８５５号は、超音波吸引装置とバイポ

ーラ電気メス装置との組み合せにおいて、ハンドピース部分の構造を詳細に開示しているが、超音波吸引装置を駆動するための駆動源と、バイポーラ電気メス装置を駆動するための駆動源とは別個に構成されており、各装置の出力をどのように処置部に作用させるかについては個々の駆動源による制御に委ねられていた。

【０００７】

本発明はこのような課題に着目してなされたものであり、その目的とするところは、少なくとも２つ以上の装置出力を有機的に結合させることで、１つの装置で、操作者が行ないたい複数の処置に必要な機能を適宜組み合わせて提供できる手術装置を提供することにある。

【課題を解決するための手段】

【０００８】

上記の目的を達成するために、本発明の第１の態様は、手術装置であって、生体に対して所定の処置を行うための処置部を有する、複数種類のハンドピースの何れかを接続するためのコネクタと、前記コネクタに接続されたハンドピースの処置部に対して所定の第１の処置を行うための駆動を行う第１の回路と、前記コネクタに接続されたハンドピースの処置部に対して前記第１の処置とは異なる第２の処置を行うための駆動を行うための、前記第１の回路とは異なる第２の回路と、前記コネクタに接続された前記ハンドピースの種類を判別するハンドピース識別回路と、前記ハンドピース識別回路による識別結果に応じて前記第１及び前記第２の回路の制御方法を変更する制御手段と、を有する。

【０００９】

また、本発明の第２の態様は、手術装置であって、生体に対して所定の処置を行うための処置部を有する、複数種類のハンドピースの何れを接続するためのコネクタと、前記コネクタに接続されたハンドピースの処置部に対して超音波振動による処置を行うための駆動を行う超音波出力回路と、前記コネクタに接続されたハンドピースの処置部に対して電気エネルギによる処置を行うための駆動を行うための電気メス出力回路と、前記コネクタに接続された前記ハンドピースの種類を判別するハンドピース識別回路と、前記ハンドピース識別回路による識別結果に応じて前記超音波出力回路と前記電気メス出力回路の制御方法を変更する制御手段と、を有する。

【発明の効果】

【００１０】

本発明によれば、少なくとも２つ以上の装置出力を有機的に結合させることができるので、１つの装置で、操作者が行ないたい複数の処置に必要な機能を適宜組み合わせて提供することができる。

【発明を実施するための最良の形態】

【００１１】

以下、図面を参照して本発明の実施形態を詳細に説明する。

【００１２】

図１は本発明の第１実施形態に係る手術装置の概略構成を示す図であり、駆動装置１６には、コネクタ２１－１とバイポーラコード１４－１とを介して、かつ、コネクタ２１－２と超音波コード１４－２とを介して、ハンドピース４０が接続されるとともに、フットスイッチ（Ｆ．ＳＷ）１５が着脱可能に接続されている。駆動装置１６の前面には電源スイッチ２２の他に、各装置の出力の大きさの設定やフットスイッチ（Ｆ．ＳＷ）１５の機能の割り付けを行なうための釦が設けられたパネル２０を有するとともに、同側面にはピンチバルブ１８－１及び１８－２が側面から突出するように設けられている。

【００１３】

ハンドピース４０にはさらにチューブ１４－３が接続され、このチューブ１４－３は分岐している。分岐した一方のチューブはピンチバルブ１８－１の凹部を介して生理食塩水ボトル１７に接続されている。また、他方のチューブはピンチバルブ１８－２の凹部を介して吸引ボトル１９に接続されている。この吸引ボトル１９は壁吸引部２３に接続されている。生理食塩水ボトル１７には生理食塩水が溜められており、ピンチバルブ１８－１の

締め付けに応じた生理食塩水がチューブ１４－３を介して被処置部に供給される。また、壁吸引部２３による吸引により、ピンチバルブ１８－２の締め付けに応じて、不要な組織が被処置部からチューブ１４－３を介して吸引ボトル１９へと吸引・収納される。

【００１４】

ハンドピース４０は、ハンドル１３を有し、図示せぬ超音波振動子が内蔵されたハンドピース本体１９と、この超音波振動子の振動を処置部８に伝達するプローブ１１からなる。このプローブ１１は組織を超音波吸引するためにプローブ長さに渡って吸引路１１－１を有する。プローブ１１はその先端を除いてシース１２に包囲されている。また、処置部８には、プローブ１１の先端に対して開閉駆動されるジョーと呼ばれる把持具１０が設けられている。この把持具１０はシース１２の先端部に図示せぬ回動ピンを中心に回動可能に連結されている。ハンドル１３を操作すると把持具１０がプローブ１１の先端に対して開閉駆動されて、プローブ１１の先端と把持具１０との間に生体組織を挟み込んで超音波凝固、切開を行なうようになっている。さらに、把持具１０とプローブ１１の先端とは二極の導電部からなり、バイポーラ式電気メスとしての機能をも有している。

【００１５】

図２は図１に示す駆動装置１６の第１の内部構成を示す図であり、超音波吸引、超音波凝固、切開を行なうために、超音波振動子を振動させる電気エネルギを発生するための超音波発振回路５１と、バイポーラ式電気メスへ供給される電気エネルギを発生するバイポーラ出力回路５２と、複数種類のハンドピースのうちどのハンドピースがコネクタ２１－１を介して接続されているかを識別するハンドピース識別回路５３と、ピンチバルブ１８－１を駆動するためのバルブ駆動回路５４と、ピンチバルブ１８－２を駆動するためのバルブ駆動回路５５と、上記した各回路の動作を統合的に制御する制御回路５０とを具備している。５６は送水源であり、図１の生理食塩水ボトル１７に対応する。５７は吸引源であり、図１の壁吸引部２３に対応する。

【００１６】

制御回路５０は駆動装置１６に接続されたハンドピースの種類をハンドピース識別回路５３により判別し、制御パラメータを変更して各エネルギ源の制御方法を変えることができる。これによって、超音波振動による組織の凝固切開と、超音波吸引と、電気メスによる組織の焼灼のうち少なくとも２つの処置を同時に又は切り換えて行なうことができる。ハンドピースの種類としては、図１に示すような、超音波振動による組織の凝固切開と、超音波吸引と、電気メスによる組織の焼灼の処置を同時に行えるタイプのものや、後述するような、超音波振動による組織の凝固切開と、電気メスによる組織の焼灼の処置を同時に行なえるタイプ、超音波吸引と電気メスによる組織の焼灼の処置を同時に行なえるタイプのものがある。

【００１７】

また、フットスイッチ（Ｆ．ＳＷ）１５において、第１ペダル１５－１（図１）を操作すると超音波凝固、切開を行なうべく超音波発振回路５１が駆動され、第２ペダル１５－２（図１）を操作すると電気メスに電気エネルギを供給すべくバイポーラ出力回路５２が駆動される。

【００１８】

図３は駆動装置１６の第２の内部構成を示す図である。前記した図２に示す駆動装置１６の構成では超音波凝固、切開、超音波吸引を行なうための発振源と、電気メスによる手術を行なうためのバイポーラ源と、バルブ駆動源とを１つの本体に収容したが、この構成では、各駆動源を別体で構成して接続部１５６、１５７を介して接続し、超音波出力用の本体に設けられた主制御部５０－１がバイポーラ出力用の制御回路５０－２とバルブ駆動用の制御回路５０－３との間で連絡を取りながら、各駆動源を統合的に制御するものである。パネル２０－２は電気メスによる手術のみを行なう場合に各種の設定を行なうために使用されるものである。

【００１９】

図４は上記したピンチバルブ１８－１、１８－２を駆動して送水量や吸引量を制御する

動作を説明するためのタイムチャートである。

【００２０】

送水源５６、吸引源５７（図２）ではある一定の送水圧や吸引圧が発生しているが、各圧力は各ピンチバルブ１８－１、１８－２を駆動してチューブ１４－３を圧搾して開閉の度合いを変化させることにより調整することができる。すなわち、ピンチバルブ１８－１、１８－２の開閉の度合いをパルス開閉信号の時間割合（デューティ）に基づいてパネル２０からあらかじめ設定しておき、フットスイッチ（Ｆ．ＳＷ）１５を操作することで調整された送水あるいは吸引を行なうことができる。

【００２１】

上記した第１実施形態によれば、少なくとも２つ以上の回路出力を結合させることで、１つの装置で、操作者が行ないたい複数の処置に必要な機能を適宜組み合わせて提供することができる。

【００２２】

図５は本発明の第２実施形態に係る手術装置の構成を示す図であり、超音波凝固、切開と電気メスによるバイポーラ凝固とを同時にまたは切り換えて行なう場合の構成を示しており、図６はその作用を説明するための図である。

【００２３】

駆動装置７０の内部にはハンドピース７１に内蔵された超音波振動子６３を振動させるための電気エネルギを発生する超音波出力回路６０と、二極の導電部を構成し、バイポーラ電気メスとしての機能を有するジョー６６及びプローブ６７の先端とに供給するための電気エネルギを発生するバイポーラ出力回路６１と、フットスイッチ（Ｆ．ＳＷ）６４の機能の割り付けや各装置の出力の大きさを設定するためのパネル６８と、フットスイッチ（Ｆ．ＳＷ）６４の操作に基づいて超音波出力回路６０の出力とバイポーラ出力回路６１の出力を制御する制御回路６２とが設けられている。

【００２４】

操作者がハンドル６５を握るとジョー６６がプローブ６７の先端に対して開閉駆動されて、ジョー６６とプローブ６７の先端との間に生体組織を挟み込むことにより超音波凝固、切開が行われる。また、バイポーラ出力回路６１からジョー６６とプローブ６７に電気エネルギを供給することにより、電気メスによる凝固が行われる。

【００２５】

図６に示すように、超音波切開を行なう場合には、フットスイッチ（Ｆ．ＳＷ）６４のペダル６４－１を操作して超音波出力を強く、かつ、バイポーラ出力を弱くすることにより、バイポーラ出力により組織変成の速度を上げながら同時に超音波出力により切開を行なうことができる。また、超音波凝固を行なう場合には、フットスイッチ（Ｆ．ＳＷ）６４のペダル６４－２を操作して超音波出力を弱く、かつ、バイポーラ出力を強くすることにより、組織がこびりつかずに凝固のみを行なうことができる。このように、組織を適度の温度でゆっくりと凝固、切開することができるが、処置速度が比較的遅いという欠点をもつ超音波凝固切開装置に、処置速度は速いが焼灼温度が高く組織が急激に焼灼されてしまうという欠点をもつ電気メス装置を組み合わせることで効率のよい処置を行なうことが可能になる。

【００２６】

図７は本発明の第３実施形態において、超音波吸引とバイポーラ電気メスの機能をもつ超音波手術装置のハンドピース内部の構成を示す図であり、超音波振動子１０３と、この超音波振動子１０３に接続されたプローブ１００と、少なくともプローブ１００先端部の周囲に積層形成された絶縁層１０１と、その上層に隣接し、かつ、プローブ１００から高周波絶縁された積層形成による導電層１０２を有し、プローブ１００との導電層１０２との間でバイポーラ電気メスを構成している。絶縁層１０１は絶縁性セラミックあるいは絶縁性プラスチックのコーティングで形成されている。ハンドピース外部には後述する操作スイッチが設けられている。

【００２７】

図８は第３実施形態におけるハンドピースの外観斜視図であり、図７に示すプローブ１００を包囲するシース３２と、図７に示す超音波振動子１０３を内蔵したハンドピース本体３０とが図示されている。このハンドピース本体３０からはバイポーラコード３４－１、超音波コード３４－２、チューブ３４－３が引き出されており、これらは後述する駆動回路に接続される。ハンドピース本体３０にはフットスイッチ（Ｆ．ＳＷ）と同等の機能をもつ操作スイッチ３３－１及び３３－２とが設けられている。

【００２８】

図９は上記した構成のハンドピースに本体部の回路構成を加えた超音波手術装置の全体構成図である。駆動部１１０はバイポーラ電気メスに供給される電気エネルギを発生するバイポーラ出力回路１０５と、超音波振動子１０３を振動させるための電気エネルギを発生する超音波発振回路１０６と、操作スイッチ３３－１及び３３－２からの信号に基づいてこれら２つの回路を制御する制御回路１０７と、各装置の出力の設定や操作スイッチ３３－１及び３３－２の機能の割り付けを行なうためのパネル１０８とを具備している。

【００２９】

操作スイッチ３３－１を操作すると制御回路１０７により超音波発振回路１０６がＯＮされ、これによって超音波振動子１０３に電気エネルギが供給されて超音波振動子１０３が振動して超音波吸引が可能になる。また、操作スイッチ３３－２を操作すると制御回路１０７によるバイポーラ出力回路１０５がＯＮされ、これによってバイポーラ電気メスに電気エネルギが供給されて焼灼処置が可能になる。

【００３０】

なお、上記した電極１０４と導電層１０２とは図１０に示すように、超音波振動子１０３の振動の節付近において接触している。図１０（Ａ）は電極１０４が導電ゴム（Ｏリング）からなる場合の接触状態を示しており、図１０（Ｂ）は電極１０４がバネ接点からなる場合の接触状態を示している。

【００３１】

上記した第３実施形態によれば、超音波処置装置にバイポーラ出力を印加できるため、処置部位を気にせず、かつ、対極板も不要になるため、安全で使い勝手の良い手術装置を提供できる。

【００３２】

図１１は上記した本発明の第３実施形態の変形例を示す図であり、超音波手術装置のハンドピース内部には、超音波振動子１０３と、この超音波振動子１０３に接続されたプローブ１００と、このプローブ１００の周囲に複数積層形成された導電層１０２－１、１０２－２と絶縁層１０１－１、１０１－２とを有し、導電層１０２－１、１０２－２はそれぞれ絶縁層１０１－１、１０１－２を挟んで高周波絶縁されており、導電層１０２－１、１０２－２間においてバイポーラ電気メスを構成している。図１２は図１１の断面図を示している。

【００３３】

図１３は上記した構成のハンドピースに駆動部の回路構成を加えた超音波手術装置の全体構成図である。この構成、作用、効果は図９と全く同様であるので説明を省略する。

【００３４】

ここで、上記した電極１０４と導電層１０２－１、１０２－２とは図１４に示すように、超音波振動子１０３の振動の節付近において接触している。ここでは電極１０４が導電ゴム（Ｏリング）からなる場合の接触状態を示している。

【００３５】

図１５は本発明の第４実施形態に係る超音波手術装置の構成を示す図である。図１５に示すように、ハンドピース２１０は吸引路２００－１を有するプローブ２００と、超音波振動子２０１と、内蔵された吸引ポンプ２０２とから構成される。また、吸引ポンプ２０２はハンドピース２１０の内部から外部へと延長する吸引チューブ２０３を介して吸引物貯留容器２０４に接続されている。また、本体部２１１は、超音波発振回路２０５と、制御回路２０６と、ピンチバルブ２０７と、操作パネル２０８とを具備する。制御回路２０

６にはフットスイッチ（Ｆ．ＳＷ）２０９が接続されている。

【００３６】

上記した構成において、操作者がフットスイッチ（Ｆ．ＳＷ）２０９の超音波出力ペダル２０９－２を操作してＯＮすると、制御回路２０６はこれに応答して超音波振動子２０１を振動させる。この振動はプローブ２００先端に伝達される。この状態で吸引ペダル２０９－１を操作してＯＮすると、制御回路２０６はこれに応答して吸引ポンプ２０２を作動させるとともに、ピンチバルブ２０７を開くように制御する。これによって、プローブ２００先端の不要な組織はプローブ２００、吸引チューブ２０３を介して吸引物貯留容器２０４に吸引、貯留される。そして、吸引ペダル２０９－１をＯＦＦすると吸引ポンプ２０２が停止されるとともにピンチバルブ２０７が閉じて吸引動作が停止される。

【００３７】

ここで、上記した電極１０４と導電層１０２－１、１０２－２とは図１４に示すように、超音波振動子１０３の振動の節付近において接触している。ここでは電極１０４が導電ゴム（Ｏリング）からなる場合の接触状態を示している。

【００３８】

上記した第４実施形態によれば、ハンドピース２１０内に吸引ポンプ２０２を設けることで、吸引チューブ２０３の両端で吸引力を働かせることができるので安定した吸引力が得られる。また、管路抵抗による吸引力低下の影響を最小限に抑えることができるため、安定して組織を吸引できる。

【００３９】

図１６は上記した第４実施形態の変形例を示す図である。その基本的な構成及びその作用は図１５と同様であるが、ここでは、ハンドピース２１０内の吸引ポンプ２０２が、吸引チューブ２０３と吸引物貯留容器２０４とを介して外部吸引手段２１２に接続されている点が異なっている。

【００４０】

このような構成によれば、外部吸引手段２１２の吸引圧は常に一定に保たれているので、吸引ペダル２０９－１の操作後、プローブ２００先端に吸引圧が発生するまでのタイムラグが少なくなるという効果がある。

【００４１】

図１７は上記した第４実施形態のさらなる変形例を示す図である。その基本的な構成及びその作用は図１５と同様であるが、本変形例では、吸引ポンプ２０２と吸引物貯留容器２０４とを結ぶ吸引チューブ２０３－１の径が細く、かつ、外部吸引手段２１２と吸引物貯留容器２０４とを結ぶ吸引チューブ２０３－３の径が太く形成されている点が異なっている。すなわち、ハンドピース２１０側の吸引チューブ２０３－１は操作性に関係するので操作性を良くするべく径を細くし、他の部分のチューブ径は圧力損失を最小限に抑えるために太径としている。さらに、本変形例では吸引物貯留容器２０４は、吸引物がいっぱいに貯留されたときに取り外して捨てることができる使い捨て容器２０４－１とこれを保持するための容器２０４－２とから構成されており、２つの容器２０４－１と２０４－２とは太径の吸引チューブ２０３－２で接続されている。

【００４２】

上記した具体的実施形態には以下のような構成の発明が含まれている。

【００４３】

１．

超音波振動子と、この超音波振動子からの振動エネルギが伝達されて超音波振動するとともに、少なくとも二極の導電部を備えた処置部とを有するハンドピースと、

このハンドピースを介して被処置部への送水を行なうとともに、被処置部からの吸引を行なう送水・吸引手段と、

前記超音波振動子を振動させるための電気エネルギを発生して前記超音波振動子に供給する超音波出力回路と、組織を焼灼するための電気エネルギを発生して前記少なくとも二極の導電部に供給する電気メス出力回路と、前記送水・吸引手段と、前記超音波出力回路

と、前記電気メス出力回路とを統合的に制御する制御手段とを有する駆動装置と、
を具備し、
前記制御手段の制御に基づいて、超音波振動による組織の凝固切開と、超音波吸引と、電気メスによる組織の焼灼のうち少なくとも２つの処置を同時に又は切り換えて行なうようにしたことを特徴とする手術装置。
【００４４】
１－１．
１．の前記送水・吸引手段は、チューブを介した被処置部への送水量と、チューブを介した被処置部からの吸引量を制御するために、前記チューブを開閉するためのピンチバルブを含む。
【００４５】
１－２．
１．１の前記ピンチバルブは、前記チューブを開閉する開閉時間の割合を変化させることによって送水量と吸引量とを制御する。
【００４６】
１－３．
１．の前記送水・吸引手段は、前記駆動装置と一体的に構成されている。
【００４７】
１－４．
１．の前記制御手段は、前記駆動装置に接続されるハンドピースの種類に応じて、各エネルギ源の制御方法を切り換える。
【００４８】
１－５．
１．の前記超音波出力回路と前記電気メス出力回路と、前記送水・吸引手段とは別体で構成され、これら各手段には、制御回路が設けられ、各手段の制御回路の１つが主制御回路として他の制御回路と連絡を取りながら全体の制御を行なう。
【００４９】
１－６．
１．の前記制御手段は、超音波振動による組織の凝固、切開、超音波吸引、電気メスによる組織の焼灼のうち特定の処置を優先して処置を行なうモードを有する。
【００５０】
２．
超音波振動子と、この超音波振動子による超音波振動を被処置部に伝達するプローブと、このプローブとは電気的に絶縁されて配置され被処置部に作用する導電性の作用部材とを含むハンドピースと、
超音波発振源と、バイポーラ電気メス発振源と、これら両発振源の発振出力を、そのタイミングと大きさとからなる組み合わせパターンで前記プローブと作用部材とに同時に供給するべく制御手段とを含む駆動装置と、
を具備する手術装置。
【００５１】
２－１．
２．の前記組み合わせパターンを任意に設定するための設定手段を有する。
【００５２】
３．
振動子と、
この振動子に接続されたプローブと、
少なくともプローブ先端部の周囲に積層形成された絶縁層と、
その上層に隣接し、かつ、プローブから高周波絶縁された積層形成による導電層と、
を具備し、
前記プローブと前記導電層との間でバイポーラ電気メスを構成したことを特徴とする超

音波手術装置。
【００５３】
３－１．
３．の前記プローブの周囲に複数の積層形成された導電層及び絶縁層を有し、前記導電層はそれぞれ前記絶縁層を挟んで高周波絶縁されており、前記導電層間においてバイポーラ電気メスを構成する。
【００５４】
３－２．
３．の前記絶縁層が絶縁性セラミックのコーティングにより形成されている。
【００５５】
３－３．
３．の前記絶縁層が絶縁性プラスチックのコーティングにより形成されている。
【００５６】
４．
振動子と
吸引路を有するプローブと、
内蔵吸引ポンプと、
を具備するハンドピースを有することを特徴とする超音波手術装置。
【００５７】
４－１．
４．の前記ハンドピース内の内蔵吸引ポンプと外部吸引手段とが、吸引チューブ及び吸引物貯留容器を介して接続されている。
【００５８】
４－２．
４．前記外部吸引手段と吸引物貯留容器とを結ぶ吸引チューブの径が、内蔵吸引ポンプと吸引物貯留容器とを結ぶ吸引チューブの径よりも太く形成されている。
【図面の簡単な説明】
【００５９】
【図１】本発明の第１実施形態に係る手術システムの概略構成を示す図である。
【図２】図１に示す駆動装置の第１の内部構成を示す図である。
【図３】図１に示す駆動装置の第２の内部構成を示す図である。
【図４】ピンチバルブを駆動して送水量や吸引量を制御する動作を説明するためのタイムチャートである。
【図５】本発明の第２実施形態に係る手術装置の構成を示す図である。
【図６】第２実施形態の作用を説明するための図である。
【図７】本発明の第３実施形態のハンドピース内部の構成を示す図である。
【図８】本発明の第３実施形態に係るハンドピースの外観斜視図である。
【図９】第３実施形態におけるハンドピースに本体部の回路構成を加えた超音波手術装置の全体構成図である。
【図１０】第３実施形態において、電極と導電層との接触状態を説明するための図である。
【図１１】本発明の第３実施形態の変形例を示す図である。
【図１２】図１１に示すハンドピースの断面図を示している。
【図１３】第３実施形態の変形例におけるハンドピースに本体部の回路構成を加えた超音波手術装置の全体構成図である。
【図１４】第３実施形態の変形例において、電極と導電層の接触状態を説明するための図である。
【図１５】本発明の第４実施形態に係る超音波手術装置の構成を示す図である。
【図１６】本発明の第４実施形態の変形例の構成を示す図である。
【図１７】本発明の第４実施形態のさらなる変形例の構成を示す図である。

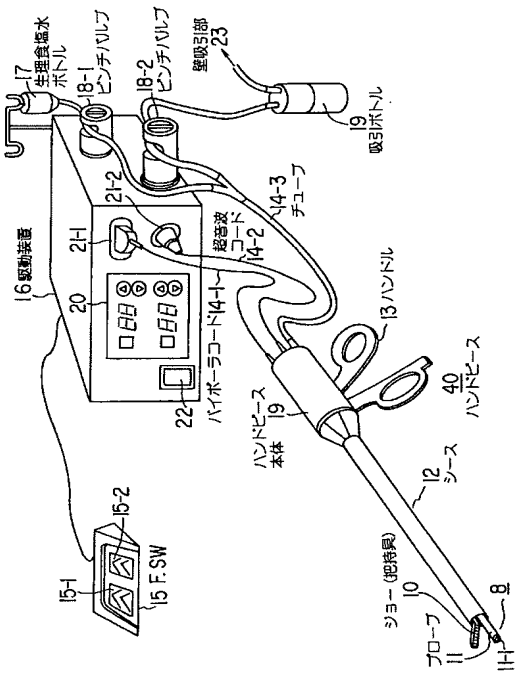
【符号の説明】

【００６０】

１０　把持具（ジョー）
１１　プローブ
１２　シース
１３　ハンドル
１４－１　バイポーラコード
１４－２　超音波コード
１４－３　チューブ
１５　フットスイッチ（Ｆ．ＳＷ）
１６　駆動装置
１７　生理食塩水ボトル
１８　ピンチバルブ
１９　ハンドピース本体
２３　壁吸引部
４０　ハンドピース

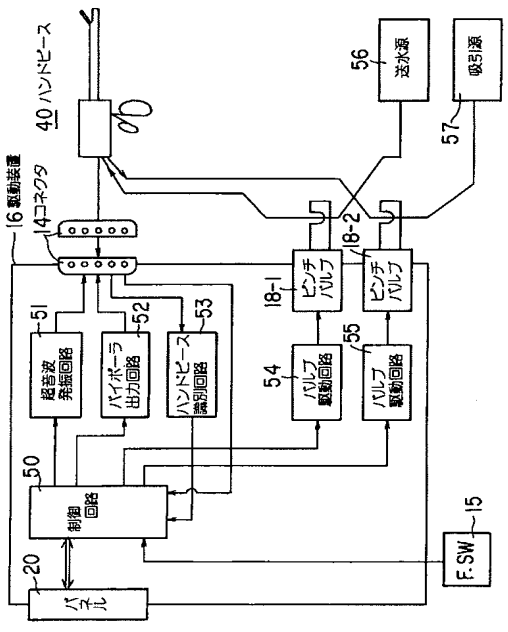
【図１】

図１



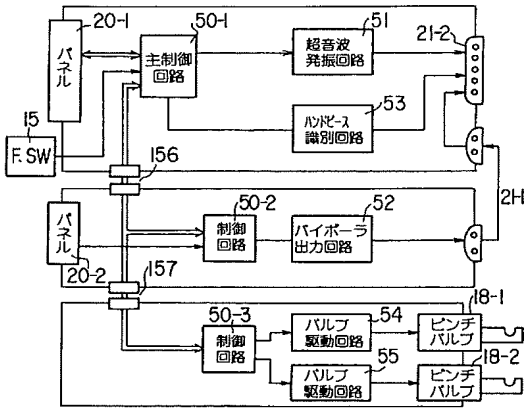
【図２】

図２



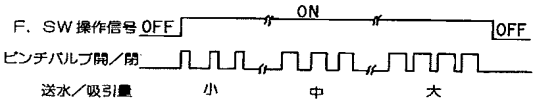
【図３】

図３



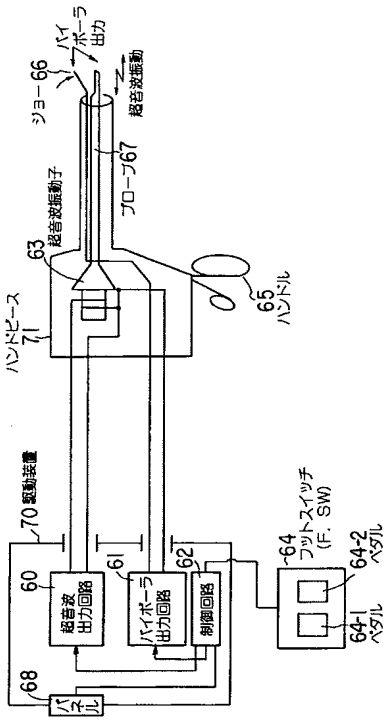
【図４】

図４



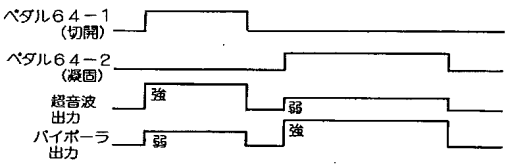
【図５】

図５



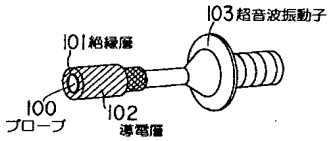
【図６】

図６



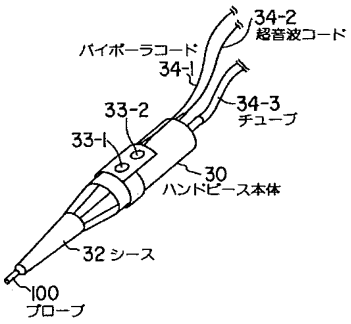
【図７】

図７



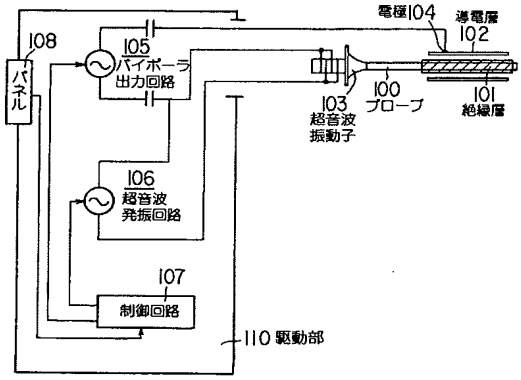
【図８】

図８



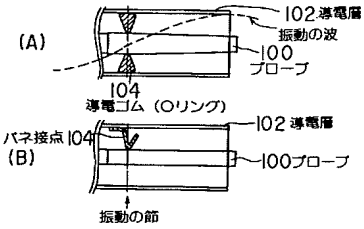
【図９】

図9



【図１０】

図10



【図１１】

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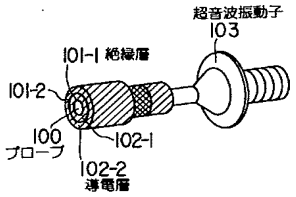

【図１２】

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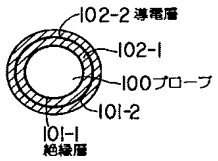
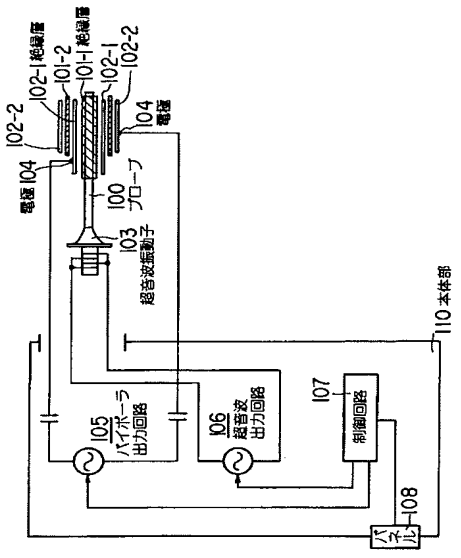


【図１３】

図13



【図１４】

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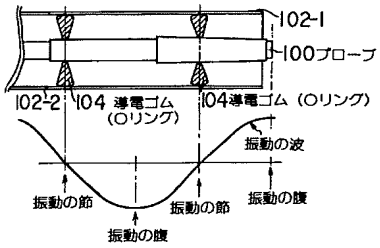
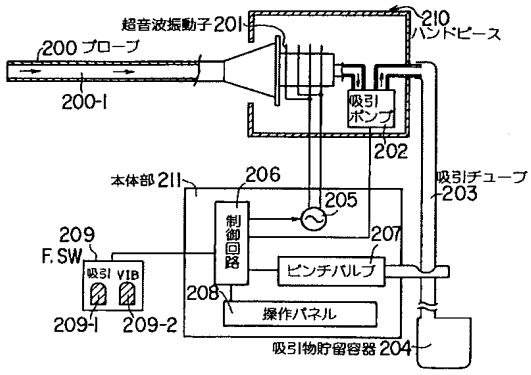


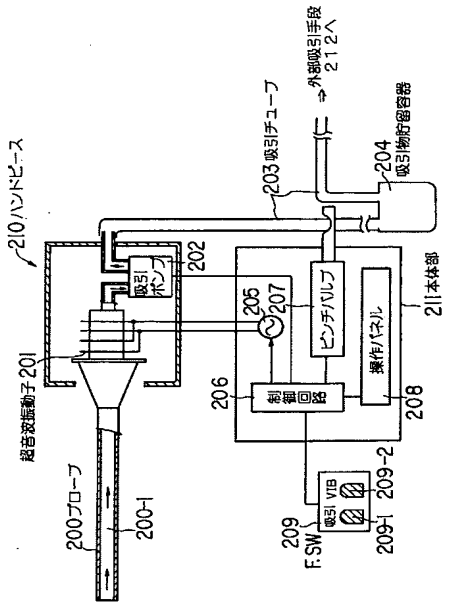
【図１５】

図15



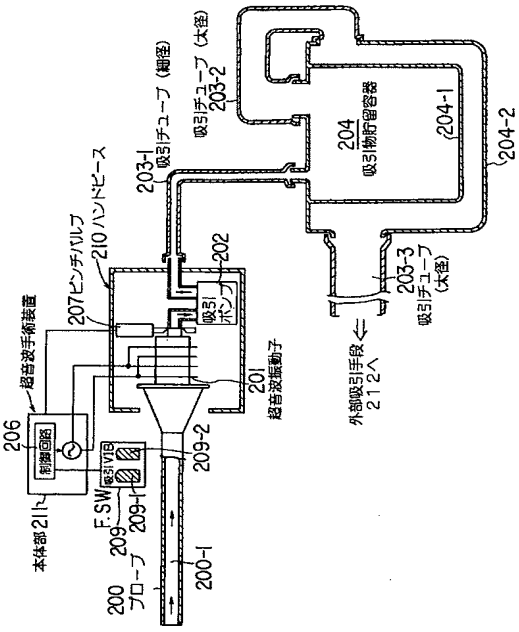
【図１６】

図16



【図１７】

図17



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Ｆターム(参考) 4C060 FF02 KK03 MM24

* NOTICES *

CLAIMS

[Claim(s)]

1. In a galvanocautery of a fluid auxiliary type the aforementioned galvanocautery, A long and slender handle which has a end face and a tip and is provided with the length direction lumen which extends between the aforementioned end face and the aforementioned tip, A suction tube in which a part is arranged in the aforementioned lumen of the aforementioned handle, and a tip extends outside the aforementioned tip of the aforementioned handle, Are the conductive electrocauterization electrode constituted so that it might be connected to a source of radio-frequency energy, and the aforementioned electrode, Have a long and slender tube which constitutes a lumen which extends between a end face of the aforementioned electrode, and a tip, and the aforementioned electrode, The aforementioned conductive electrocauterization electrode arranged in the aforementioned suction tube so that a tip of the aforementioned electrode may extend in the direction of a tip across the aforementioned tip of the aforementioned suction tube, Connected with the aforementioned end face of the aforementioned electrode, and fluid communicating was carried out to the aforementioned lumen of the aforementioned electrode, A galvanocautery of a fluid auxiliary type having a fluid input tube which it is a fluid input tube, and conductive fluid supplied from the aforementioned input tube is supplied along with the aforementioned electrode, and is emitted from the aforementioned tip of the aforementioned electrode.
2. Galvanocautery according to claim 1 which aforementioned tip of aforementioned electrode is formed evenly and has blade-like form.
3. Galvanocautery according to claim 1 which has further suction hose in which it came to communicate between aforementioned end face of aforementioned suction tube, and suction pump in order to suck smoke and fluid in electrocauterization.
4. Position in which, as for aforementioned suction tube, tip of aforementioned electrode extends across aforementioned tip of aforementioned suction tube and which was retracted completely, The galvanocautery according to claim 1 slidably arranged in the aforementioned handle so that the aforementioned tip of the aforementioned electrode can slide between positions which are arranged in the aforementioned suction tube, and which advanced completely.
5. In a method of performing, electrocauterization an aforementioned method, (a) A method of having a process of applying radio-frequency energy to an electrocauterization part via a conductive hollow electrode, and the (b) process (a) and a process of injecting into the aforementioned electrocauterization part simultaneously a conductive liquid emitted from the aforementioned electrode of performing electrocauterization.
6. Method according to claim 5 of having further process of sucking smoke and fluid from aforementioned electrocauterization part with suction tube which surrounds aforementioned electrode partially.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
Fluid auxiliary electrocauterization equipment More particularly, the field present invention of invention relates to electrocauterization equipment about the field of a medical device as a whole.
The electrocauterization equipment of various kinds for performing incision and cautery of invention of background systems of the body is known for the medical field, and it is used. Typically, the conductive blade or needle which serves as one electrode of an electric circuit is contained in such equipment. An electrode circuit is completed by connecting a ground electrode to a patient. Incision of an organization is completed by adding an electrical energy source (most generally high frequency generator) to a blade. If a blade is applied in an organization, a voltage gradient will occur and current and related generation of heat will occur by this in a contact place. When the level of electrical energy is sufficient expensive, the generated heat can cauterize a blood vessel simultaneously with cutting sufficiently for cutting an organization, and advantageously.
In the prior art, it becomes [whether in many cases it generates by the electrocauterization of an organization, and], and is diffusely careful by a lot of smoke being unpleasant at least depending on the case, and it is widely known depending on the case that it is dangerous for an operator and a paramedical personnel. Therefore, equipping electrocauterization equipment with the flue gas performance which discharges promptly the smoke generated by the electrocauterization from an incision region is proposed, and it is generally performed. Flue gas can be performed by providing the inlet port connected with a negative pressure source, i.e., suction sources, near the electrocauterization blade / the electrode of the handle of electrocauterization equipment. "The example was endowed with the waiver junior Electrocauterization equipment and a method, US,4,307,720,B of a title called and the cleaning method", It describes in US,5,242,442,B of the title the "flue gas type electrosurgical device" endowed with Hirschfeld, and US,5,269,781,B of the title the "suction auxiliary electrocauterization unit" endowed with HEWERU.
When the solidified blood collected on the electrode/blade of electrocauterization equipment, organization waste, and other waste produce a problem, for example, wipe a blade with gauze etc. for an operator, it needs to clean a blade periodically. This needs to interrupt the section in cleaning of an electrode/blade, and, generally, is considered not to be desirable for a risk of following on contamination of a blade, i.e., incision equipment, damage to a blade, and wounded [of an operator] increasing etc.
In order to solve this problem, if a blade is retracted in a handle, by the prior art, it will have been proposed that an electrode/blade provides the galvanocautery which engaged with the handle of the instrument slidably so that the waste adhering to a blade may fail to be automatically scratched from the chip of a handle. Such an instrument is described in the '720 patent of the waiver of upper **. According to this composition, although the advantage of a certain degree is acquired, once a blade is retracted, it is still necessary to wipe off the chip of a handle. To this problem furthermore, a direct and effective method is decreasing the quantity of the waste by which it is generated in an electrocauterization process, and decreasing, even if the necessity for cleaning of an electrode/blade is abolished by this or it is small.
The outline present invention of invention relates to providing an improvement galvanocautery in view of the above consideration.

According to one working example of the present invention, if a suction tube is advanced, an electrode/blade will be covered in a tube, and a galvanocautery has the electrode/blade arranged in a drawing-in type suction tube so that it may expose, in order that the tip of an electrode/blade may perform the electrocauterization, if a suction tube is drawn in.
According to one characteristics of the present invention, the electrode/blade for electrocauterization have the conductive hollow tube which made the tip even in a blade-like form. Conductive fluid is added to the end face of a hollow electrode / blade, and is emitted from the tip of an electrode/blade into the electrocauterization.
According to one characteristics of the present invention, the conductive fluid which came out of the electrode/blade keeps away high frequency electrocauterization energy from a blade, and thereby, actually, cutting of an organization is not a metal blade and is mainly performed by the fluid. That is, a fluid acts as a "virtual" electrocauterization electrode. In order for not a blade but a fluid to perform incision and cautery, an organization does not burn, or a hole does not open in an organization, and the quantity of the waste which comes out at the time of incision decreases. The flow of the fluid which passes an electrode/blade has the tendency to hold a blade at low temperature purely.
The characteristics of more than and everything but brief explanation of the drawings this invention will be best understood by referring to the detailed description of the specific working example of the present invention in relation to an accompanying drawing.
Fig. 1 is a perspective view of a galvanocautery by one working example of the present invention.
Fig. 2 is an expansion perspective view at a tip of the electrode/blade of a galvanocautery of Fig. 1.

Reference of detailed description Fig. 1 of the specific working example of the present invention has shown the perspective view of the fluid auxiliary galvanocautery 10 by one working example of the present invention in this figure. The galvanocautery 10 contains the handle 12, the suction tube 14, and the electrocauterization electrode / blade 16. The handle 12 is made by sterilized rigidity, such as nylon, being nonconducing preferably. It is made of a sterilized nonconductor preferably, the part is slidably arranged in the lumen of the handle 12, and the suction tube 14 is projected in the direction of a tip besides the end of a handle. The electrode / blade 16 is arranged in the suction tube 14 and the handle 12. The suction tube 14 slides forward and backward about the handle 12 and the electrode 16 by the sliding lever 18 extended out of the slot 19 of the handle 12 (in namely, the direction of the arrow 20 of Fig. 1). In the state where the suction tube 14 is in the depression position shown in Fig. 1, the tip end part of the electrode / blade 16 is projected across the tip of the tube 14, therefore can perform the

electrocauterization. When a suction tube is in an advance position, the suction tube 14 covers the tip of an electrode / blade 16 completely.
According to one characteristics of the present invention, preferably, the electrode / blade 16 is formed using the cylindrical shape hollow tube which flattened the tip, as shown in the expansion perspective view of Fig. 2. It flattens, and also a part of tip of an electrode / blade 16 is removed, and the length direction slit 22 is formed.
Three joining segments are provided by the galvanocautery 10. One terminal (for example, positive electrode) of a high frequency (RF) generator (not shown in Fig. 1) is electrically connected to an electrode / blade 16 via the lead 24, The supply source of the fluid which should be emitted from the slit 22 of an electrode / blade 16 is connected with the end face of an electrode / blade 16 via the flexible tube 26, i.e., a hose, and the suction hose 28 is connected with the handle 12 so that it may communicate with the lumen of the handle 12, and the suction tube 14. If a suction force is applied via the hose 28, air and a fluid will be drawn at the tip of the suction tube 14, as the arrow 30 shows. Since it can advance the suction tube 14 about an electrode / blade 16 or retract, the suction tube 14 can be alone used for the operator of an instrument, without being able to perform the electrocauterization, sucking smoke and a fluid from an incision part, or performing the electrocauterization.
As mentioned above, conductive fluid is poured from the inflow tube 26, and it passes along with the length of an electrode / blade 16, and emits from the tip of an electrode/blade. This is performed in order to form what is called a virtual electrode for carrying out the electrocauterization. It is Peter M to add radio-frequency energy simultaneously with the injection of conductive fluid on August 27, 1993.
J. U.S. patent application 08th of a title called "the method and equipment" for performing high frequency excision for which it applied in the name of Mueller and Michael F. Hui / No. 113,441, U.S. patent application 08th of a title called "the method and equipment" for performing high frequency excision for which it applied in the name of Peter M.J. Mueller on September 8, 1994 / No. 303,246, And it is discussed still in detail by U.S. patent application 08th of a title called "the method and equipment" for performing high frequency excision for which it applied on September 8, 1994 in the name of heater M.J. Mueller and Michael F. Hui / No. 302,304. '441 application of upper **, '246 application, and '304 application (in a lower sentence, these applications are collectively called "high frequency excision application") are respectively transferred to a grantee of the present invention.
By having touched such patent application, contents currently disclosed in the patent application should be incorporated into this Description.

A "virtual electrode" is formed by injecting conductive fluid into a radio-frequency energy application region as it describes in the high frequency excision patent. The size and form of a virtual electrode can deform under control, are made to conductivity to some extent, and can change a spread of radio-frequency energy by this. The size of a "virtual electrode", form, and strength, i.e., the strength of generation of heat in a region, are controllable by changing factors, such as radio-frequency energy and temporal duration, grouting velocity of a conductive liquid, and the conductivity of the injected solution.
Overheating of an electrode/blade is prevented, and when a solution is not added, the part from which the organization which usually produces burns and ****** happens is kept from becoming largely by adding a conductive solution during application of radio-frequency energy in the case of the electrocauterization equipment by the present invention. Since this effect is heightened, it is possible to cool the solution injected first first.
It divides to the conductive solution considered to be suitable for formation of a virtual electrode, and a physiological saline, saturation physiology salt salt water, and the Ringer's solution are contained in it. It is good to connect the conventional pump with the input line 26 about the source of conductive fluid. In another mode, the small canister containing a conductive solution by which precompression was carried out is used so that a pump may not be needed.
In one working example, the handle 12 receives such an overpressure canister in an inside, and it can form it so that the necessity for the input line 26 may be abolished.
In the working example of Fig.1, although the input line 26, the suction line 28, and the electrical connection 24 are shown independently, these connecting parts to the absorber goods 10 are summarized, an inside can be equipped with two separate lumens which lead a fluid, and the insulated lead can make it the single line provided along with the side part.
The form of various modifications of an electrode / blade 16 is also considered. In one working example, it replaces with the tube form which Fig. 1 and Fig. 2 flattened, and a metal porosity element is used.
It is clear that the method and equipment for performing the fluid auxiliary electrocauterization of systems of the body which form the virtual electrode in which the fluid discharged from the hollow electrode / blade for electrocauterization cuts open and cauterizes an organization from the detailed description of the more than of the specific working example of the present invention were disclosed.
Although the specific working example of the present invention was described, this is performed in order to show the various characteristics of the present invention chiefly, and does not try not to limit about the range of the present invention. Although the working example discussed specifically is included in this Description, it is possible to give the working example of disclosure, without deviating from the pneuma and the range of this Description which described various substitution which is not limited to this, change, and/or deformation in attached Claim.

[Translation done.]

DRAWINGS

[Drawing 1]

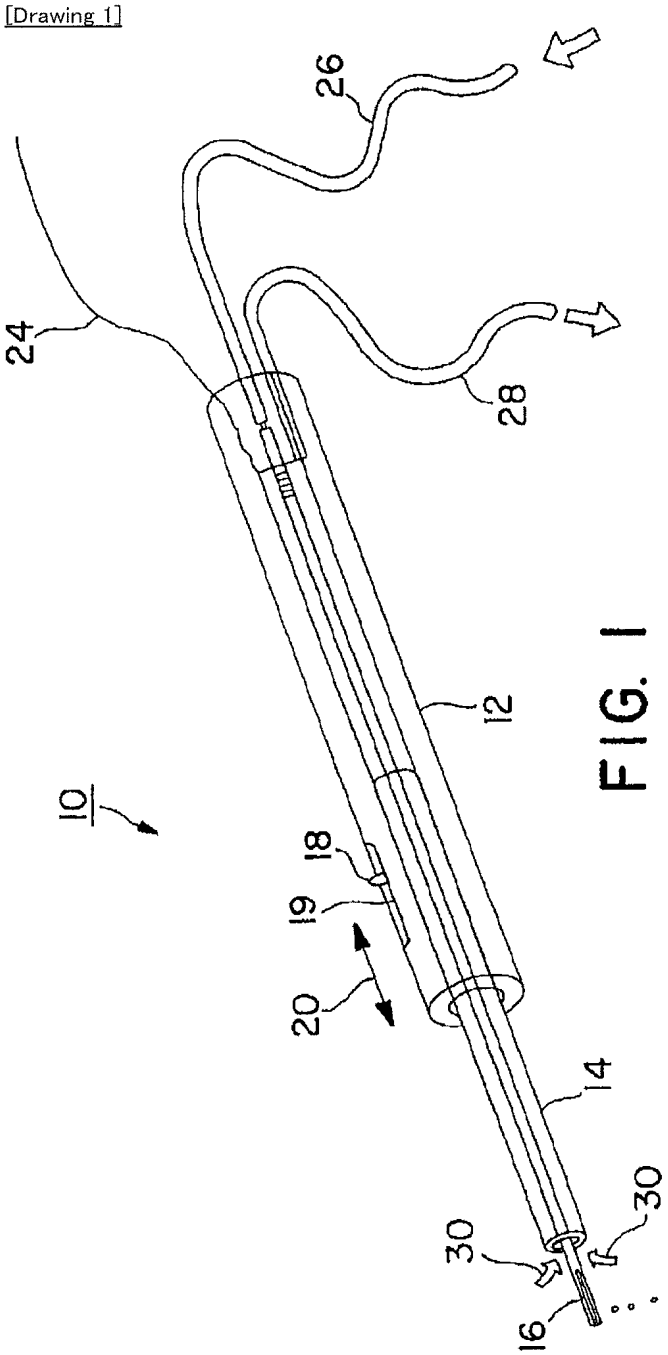

FIG. 1

[Drawing 2]

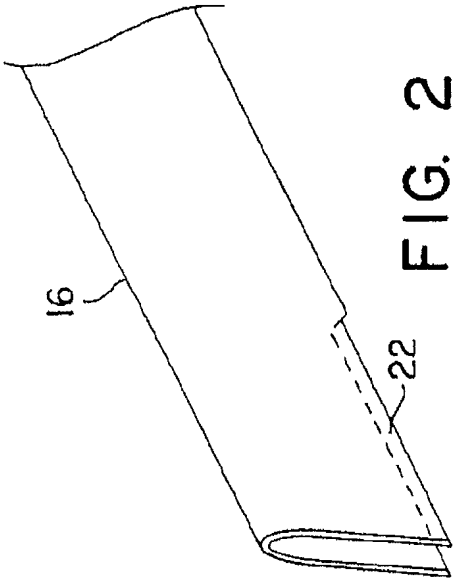

FIG. 2

[Translation done.]

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(54)【発明の名称】　流体補助電気焼灼装置

(57)【要約】
導電性流体源が中空電極の基端に連結された電気焼灼器である。導電性流体は、前記電極と連通し、電気焼灼中に電極の先端から放出されて「仮想電極」を形成する。注入された導電性液体は、高周波電気焼灼エネルギを導電性電極から離隔させ、これによって熱の発生領域を移動させて、従来の電気焼灼電極によって発生させられる燃焼や穿孔の程度を減少させる。一つの実施例では、電極の一部は、引込み式電気焼灼箇所から煙及び流体を吸引する吸引チューブの先端の内部に配置され、且つ、この先端から外方に延在する。吸引チューブを完全に前進させた場合には、電極は吸引チューブ内に隠され、電気焼灼を行うことなく吸引を行うことができる。

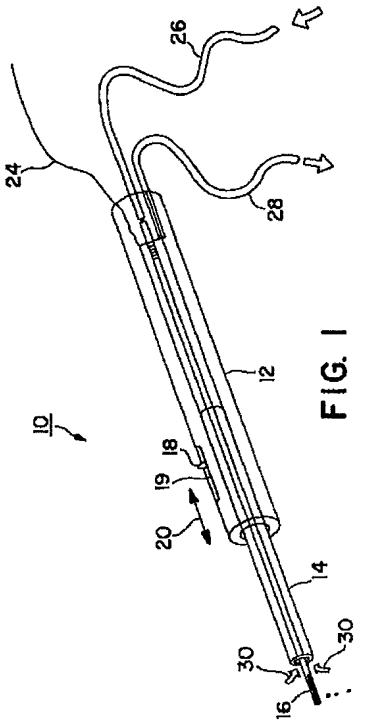

FIG. 1

【特許請求の範囲】

１．流体補助式の電気焼灼器において、前記電気焼灼器は、

基端及び先端を有し、前記基端と前記先端との間に延在する長さ方向内腔を備える、細長いハンドルと、

一部が前記ハンドルの前記内腔内に配置され、先端が前記ハンドルの前記先端の外に延在する、吸引チューブと、

高周波エネルギ源に接続されるように構成された導電性電気焼灼電極であって、前記電極は、前記電極の基端と先端との間に延在する内腔を構成する細長いチューブを備え、前記電極は、前記電極の先端が前記吸引チューブの前記先端を越えて先端方向に延在するように前記吸引チューブ内に配置されている、前記導電性電気焼灼電極と、

前記電極の前記基端に連結され、かつ、前記電極の前記内腔と流体連通した、流体入力チューブであって、前記入力チューブから供給された導電性流体が前記電極に沿って供給され、前記電極の前記先端から放出される、流体入力チューブと、

を有することを特徴とする、流体補助式の電気焼灼器。

２．前記電極の前記先端は平坦に形成されてブレード状形体を有する、請求項１に記載の電気焼灼器。

３．電気焼灼中に煙及び流体を吸引するため、前記吸引チューブの前記基端と吸引ポンプとの間に連通されるようになった吸引ホースを更に有する、請求項１に記載の電気焼灼器。

４．前記吸引チューブは、前記電極の先端が前記吸引チューブの前記先端を越えて延在する完全に引っ込められた位置と、前記電極の前記先端が前記吸引チューブ内に配置された完全に前進した位置との間で摺動できるように、前記ハンドル内に摺動自在に配置されている、請求項１に記載の電気焼灼器。

５．電気焼灼を行う方法において、前記方法は、

（ａ）導電性中空電極を介して電気焼灼箇所に高周波エネルギを印加する工程と、

（ｂ）工程（ａ）と同時に、前記電極から放出された導電性の液体を前記電気焼灼箇所に注入する工程と、

を有することを特徴とする、電気焼灼を行う方法。

６．前記電極を部分的に包囲する吸引チューブによって前記電気焼灼箇所から煙及び流体を吸引する工程を更に有する、請求項５に記載の方法。

【発明の詳細な説明】

流体補助電気焼灼装置

発明の分野

本発明は、全体として、医療器具の分野に関し、更に詳細には、電気焼灼装置に関する。

発明の背景

身体組織の切開及び焼灼を行うための様々な種類の電気焼灼装置が医療の分野で知られており且つ使用されている。代表的には、このような装置には、電気回路の一方の電極として役立つ導電性のブレード又はニードルが含まれる。電極回路は、接地電極を患者に接続することによって完成する。組織の切開は、電気エネルギ源（最も一般的には、高周波発生器）をブレードに加えることによって完了する。ブレードを組織に当てると、電圧勾配が発生し、これによって電流及び関連した発熱が接触箇所で発生する。電気エネルギのレベルが十分に高い場合には、発生した熱は組織を切断するのに十分であり、有利には、血管を切断と同時に焼灼できる。

従来技術において、組織の電気焼灼によって多くの場合に発生するかなり大量の煙は、少なくとも不快であり、場合によっては注意を散漫にし、場合によっては術者及び医療補助員にとって危険であるということが広く知られている。そのため、電気焼灼によって発生した煙を切開領域から迅速に排出する排煙性能を電気焼灼装置に備えることが提案されており、一般的に行われている。排煙は、負圧源即ち吸引源に連結される入口ポートを、電気焼灼装置のハンドルの電気焼灼ブレード／電極の近くに設けることによって行うことができる。例は、ウェーバー・ジュニアに賦与された「電気焼灼装置及び方法、及びそのクリーニング方法」という標題の米国特許第４，３０７，７２０号、ハーシュフェルドに賦与された「排煙式電気手術装置」という標題の米国特許第５，２４２，４４２号、及びへウェルに賦与された「吸引補助電気焼灼ユニット」という標題の米国特許第５，２６９，７８１号に記載されている。

電気焼灼装置の電極／ブレードに溜まった凝固した血液、組織屑、及び他の屑

が術者にとって問題を生じ、例えばブレードをガーゼ等で拭くこと等によってブレードのクリーニングを定期的に行うことを必要とする。これは、一般的には、電極／ブレードのクリーニングには切開術を中断する必要があり、ブレード即ち切開装置の汚染、ブレードの損傷、術者の受傷に伴う危険が増大する等のため、望ましくないと考えられている。この問題点を解決するため、従来技術では、ブレードをハンドル中に引っ込めると、ブレードに付着した屑がハンドルのチップから自動的に掻き落とされるように、電極／ブレードが器具のハンドルと摺動自在に係合した電気焼灼器を提供することが提案されてきた。このような器具は、上掲のウェーバーの’７２０特許に記載されている。この構成によれば、或る程度の利点が得られるが、それでも、ひとたびブレードが引っ込められると、ハンドルのチップを拭き取る必要がある。この問題点に対する更に直接的であり且つ効果的な方法は、電気焼灼プロセス中に発生する屑の量を減少し、これによって、電極／ブレードのクリーニングの必要をなくすか或いは少なくとも減少することである。

発明の概要

本発明は、以上の配慮に鑑み、改良電気焼灼器を提供することに関する。

本発明の一実施例によれば、電気焼灼器は、吸引チューブを前進させると電極／ブレードがチューブ内に覆い隠され、吸引チューブを引っ込めると電極／ブレードの先端が電気焼灼を行うために露呈するように引込み式吸引チューブ内に配置された電極／ブレードを有する。

本発明の一つの特徴によれば、電気焼灼用電極／ブレードは、先端をブレード状形体に平らにした導電性中空チューブを有する。導電性流体は、中空電極／ブレードの基端に加えられ、電気焼灼中に電極／ブレードの先端から放出される。本発明の一つの特徴によれば、電極／ブレードから出た導電性流体が高周波電気

焼灼エネルギをブレードから遠ざけ、これにより、組織の切断が、実際には、金属製ブレードでなく主として流体によって行なわれる。即ち、流体は「仮想」電気焼灼電極として作用する。切開及び焼灼を行うのがブレードでなく流体であるため、組織が燃えたり組織に穴が開いたりすることがなく、切開時に出る屑の量

が減少する。更に、電極／ブレードを通過する流体の流れは、ブレードを清浄に且つ低温に保持する傾向がある。

図面の簡単な説明

本発明の以上の及び他の特徴は、本発明の特定の実施例の詳細な説明を添付図面と関連して参照することにより最もよく理解されるであろう。

第１図は、本発明の一実施例による電気焼灼器の斜視図であり、

第２図は、第１図の電気焼灼器の電極／ブレードの先端の拡大斜視図である。

本発明の特定の実施例の詳細な説明

第１図を参照すると、この図には、本発明の一実施例による流体補助電気焼灼器１０の斜視図が示してある。電気焼灼器１０は、ハンドル１２、吸引チューブ１４、及び電気焼灼電極／ブレード１６を含む。ハンドル１２は、好ましくは、ナイロン等の殺菌された剛性の不導体でできている。吸引チューブ１４もまた、好ましくは、殺菌された不導体でできており、一部がハンドル１２の内腔内に摺動自在に配置されており、ハンドルの端部の外に先端方向に突出している。電極／ブレード１６は、吸引チューブ１４及びハンドル１２内に配置されている。吸引チューブ１４は、ハンドル１２のスロット１９の外に延びる摺動レバー１８によって、ハンドル１２及び電極１６に関して前後に（即ち第１図の矢印２０の方向に）摺動するようになっている。吸引チューブ１４が第１図に示す引っ込み位置にある状態では、電極／ブレード１６の先端部分はチューブ１４の先端を越えて突出しており、そのため、電気焼灼を行うことができる。吸引チューブが前進位置にある場合には、吸引チューブ１４は電極／ブレード１６の尖端を完全に覆い隠す。

本発明の一つの特徴によれば、電極／ブレード１６は、好ましくは、第２図の拡大斜視図に示すように、先端を平らにした円筒形中空チューブを使用して形成されている。平らにされている他、電極／ブレード１６の先端の一部を除去し、長さ方向スリット２２が形成されている。

電気焼灼器１０には三つの連結部分が設けられている。高周波（ＲＦ）発生器（第１図には示さず）の一方の端子（例えば正極）を導線２４を介して電極／ブ

レード１６に電気的に接続し、電極／ブレード１６のスリット２２から放出されるべき流体の供給源が電極／ブレード１６の基端に可撓性チューブ即ちホース２６を介して連結され、吸引ホース２８が、ハンドル１２の内腔及び吸引チューブ１４と連通するようにハンドル１２に連結されている。ホース２８を介して吸引力を加えると、空気及び流体が矢印３０が示すように吸引チューブ１４の先端に引込まれる。吸引チューブ１４を電極／ブレード１６に関して前進させたり引っ込めたりできるため、器具のオペレータは、切開箇所から煙や流体を吸引しながら電気焼灼を行うことができ、又は電気焼灼を行わずに吸引チューブ１４を単独で使用できる。

上述のように、導電性流体を流入チューブ２６から流し、電極／ブレード１６の長さに沿って流し、電極／ブレードの先端から放出する。これは、電気焼灼を実施するためのいわゆる仮想電極を形成するために行われる。導電性流体の注入と同時に高周波エネルギを加えることは、１９９３年８月２７日にピーターM．Ｊ．ミュラー及びマイケルＦ．ホイの名で出願された「高周波切除を行うための方法及び装置」という標題の米国特許出願第０８／１１３，４４１号、１９９４年９月８日にピーターM．Ｊ．ミュラーの名で出願された「高周波切除を行うための方法及び装置」という標題の米国特許出願第０８／３０３，２４６号、及び１９９４年９月８日にヒーターM．Ｊ．ミュラー及びマイケルＦ．ホイの名で出願された「高周波切除を行うための方法及び装置」という標題の米国特許出願第０８／３０２，３０４号に更に詳細に論じられている。上掲の‘４４１出願、‘２４６出願、及び‘３０４出願（下文において、これらの出願を纏めて「高周波切除出願」と呼ぶ）は、各々、本発明の譲受人に譲渡されており、これらの特

許出願に触れたことにより、その特許出願に開示されている内容は本明細書中に組入れたものとする。

高周波切除特許に記載されているように、高周波エネルギ適用領域に導電性流体を注入することにより、「仮想電極」を形成する。仮想電極の大きさ及び形状は制御下で変形でき、多かれ少なかれ導電性にでき、これによって高周波エネルギの拡がりを変えることができる。高周波エネルギ及び持続時間、導電性液体の

注入速度、及び注入した溶液の導電性等の要因を変化させることによって、「仮想電極」の大きさ、形状、及び強さ、即ち領域内での発熱の強さを制御できる。本発明による電気焼灼装置の場合には、高周波エネルギの適用中に導電性溶液を加えることにより、電極／ブレードの過熱を阻止し、溶液が加えられない場合に通常生じる組織の燃えや焦げが起こる箇所が大きくならないようにする。この効果を高めるため、先ず最初に、注入される溶液を冷却することが考えられる。

仮想電極の形成に適していると考えられる導電性溶液には、とりわけ、生理食塩水、飽和生理食塩塩水、リンゲル溶液が含まれる。導電性流体源に関し、入力ライン２６に従来のポンプを連結するのがよい。別の態様では、ポンプが必要とされないように、導電性溶液が入った小さな予圧されたキャニスタを使用する。一実施例では、ハンドル１２は、このような過圧キャニスタを内部に受け入れ、入力ライン２６の必要をなくすように形成できる。

図１の実施例では、入力ライン２６、吸引ライン２８、及び電気接続部２４が別々に示してあるが、吸収体物品１０へのこれらの連結部を纏め、流体を導く二つの別々の内腔を内部に備え、絶縁された導線が側部に沿って設けられた単一のラインにすることができる。

電極／ブレード１６の様々な変形例の形体も考えられる。一実施例では、第１図及び第２図の平らにしたチューブ形体に代えて金属製多孔質エレメントが使用される。

本発明の特定の実施例の以上の詳細な説明から、電気焼灼用中空電極／ブレードから排出された流体が組織を切開し焼灼する仮想電極を形成する、身体組織の

流体補助電気焼灼を行うための方法及び装置が開示されたことは明らかである。

本発明の特定の実施例を説明したが、これは、専ら本発明の様々な特徴を示す目的で行ったものであって、本発明の範囲に関して限定を行おうとするものではない。本明細書中に特定的に論じた実施例を含むがこれに限定されない様々な代替、変更、及び／又は変形を、添付の請求の範囲に記載した本明細書の精神及び範囲から逸脱することなく、開示の実施例に施すことが考えられる。

【図１】

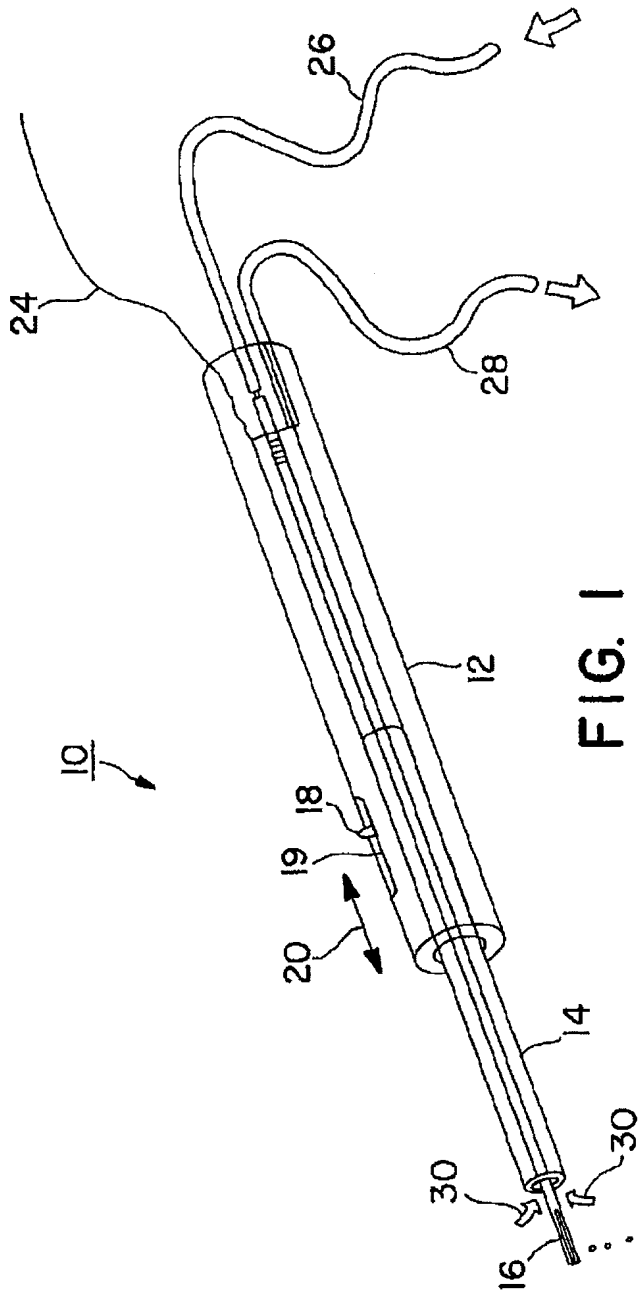

FIG. 1

【図２】

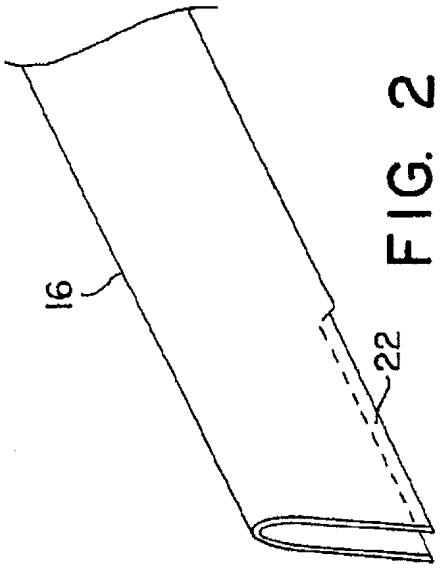

FIG. 2

【国際調査報告】

INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/US 96/15796

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61B18/14 A61M1/00

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 6 A61B A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 326 529 A (DOSS JAMES D ET AL) 27 April 1982 see abstract; figures 1-5 see column 3, line 13 - column 4, line 10 ---	1-4
Y	US 5 472 441 A (EDWARDS STUART D ET AL) 5 December 1995 see abstract; figure 1 see column 7, line 1 - line 55 ---	1-4
A	US 1 735 271 A (SUTTEN H. GROFF) 12 November 1929 see page 1, line 44 - page 2, line 10; figure 1 --- -/--	2

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* 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 document 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
2 June 1997	12.06.97

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Zeinstra, H

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/US 96/15796

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 90 03152 A (CONSIDINE JOHN ;COLIN JOHN BUNCE (GB)) 5 April 1990 see abstract; figures 6-9 see page 9, line 14 - page 12, line 8	1,3,4
A	US 5 167 659 A (OHTOMO NAOKI ET AL) 1 December 1992 see abstract; figures 1-3 see column 1, line 63 - column 2, line 37 see column 3, line 11 - line 68	1
A	US 5 401 272 A (PERKINS RODNEY C) 28 March 1995 see abstract; figure 1A see column 2, line 59 - column 3, line 35	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 96/ 15796

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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. [X] Claims Nos.: 5,6
because they relate to subject matter not required to be searched by this Authority, namely:
PCT Rule 39.1 (iv)

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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest.

[ ] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. onal Application No
PCT/US 96/15796

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		JP 7034805 B	19-04-95
US 5401272 A	28-03-95	US 5441498 A	15-08-95

PATENT ABSTRACTS OF JAPAN

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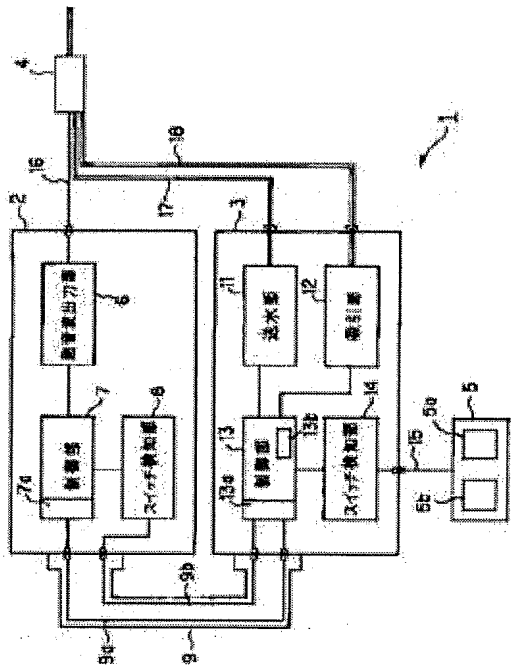
(71)Applicant : OLYMPUS OPTICAL CO LTD
(72)Inventor : TAKAHASHI HIROYUKI

(54) LIQUID SUPPLY/COLLECTION DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a liquid supply/collection device which is economical and has a wide application and is not only simply used by itself but also capable of being controlled together with an ultrasonic surgery device and a high radio frequency surgery device.
SOLUTION: Both the water supplying part 11 for feeding water and the suction part 12 for sucking water are controlled by a control part 13, and they are used separately, but also when he ultrasonic surgery device 2 is connected through a communication cable 9, the kind of the connected device is recognized by the communication between both for sending and receiving the ID information to become an interlocked control condition, and, for instance, when the ultrasonic pedal 5a of a foot switch 5 is trodden on, the ultrasonic operating device 2 outputs an output signal for ultrasonically driving it to an ultrasonic probe 4, and also a water supply/suction device 3 jets the liquid from the end opening of the ultrasonic probe 4 through the water supplying part 11 so that both devices can be interlockedly operated.



* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]A feeding means which supplies a fluid.
A recovery means which carries out suction recovery of the fluid etc.
In a fluid supply recovery system provided with the above,
A means of communication which communicates with an ultrasonic surgery apparatus or a high frequency operation system connected selectively, In accordance with classification of equipment identified by device identification means to identify classification of connected equipment, and the aforementioned device identification means, A fluid supply recovery system having a control means of the aforementioned feeding means and a recovery means which is interlocked with operation of the aforementioned ultrasonic surgery apparatus or a high frequency operation system, and operates a feeding means at least by communication with the aforementioned ultrasonic surgery apparatus or a high frequency operation system.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]The present invention relates to the fluid supply recovery system in which supply of a fluid etc. and collecting operation are possible in conjunction with the ultrasonic surgery apparatus or high frequency operation system connected.
[0002]
[Description of the Prior Art]In recent years, in order to perform a surgical operation, the high frequency operation system (electrotome) which takes a measure by energizing the ultrasonic surgery apparatus and high frequency current by an ultrasonic wave came to be used widely. For example, with the ultrasonic surgery apparatus of JP,H6-38973,A, supersonic vibration is transmitted to a probe, and it is equipment which crushes, emulsifies and sucks an organization, and mainly comprises an ultrasonic outputting part, a returning-water suction part, and a switch part.
[0003]It is for collecting the organizations and rinsing liquid (cooling fluid) which were emulsified in order to cool a probe, in order that the role of a returning-water suction part may wash an organization at this time. These days, there is also ultrasonic coagulotomy equipment which comprises an ultrasonic outputting part which does not have a returning-water sucking function as it discloses in JP,H9-38098,A, and a switch part.
[0004]Fig.7 shows the composition of the conventional ultrasonic surgery apparatus 51 relevant to the present invention. The ultrasonic probe 53 which conducts the operation which this ultrasonic surgery apparatus 51 was connected to the main device 52 and this main device 52, and the operator gripped, and used the ultrasonic wave, It is connected to the main device 52 and has the foot switch 54 which performs operation which controls ON/OFF of an ultrasonic output, etc. to the ultrasonic probe 53 via this main device 52.
[0005]The returning-water part 55 which returns water in the main device 52, and the suction part 56 to suck, It has the ultrasonic outputting part 57 which outputs an ultrasonic wave, and the control part 58 which controls these, Having the switch detection part 59 which detects operation of the ultrasonic pedal 54a of the foot switch 54, and the returning-water pedal 54b, the control part 58 controls operation of a returning-water part and the ultrasonic outputting part 58 by the detection result of this switch detection part 59.
[0006]The returning-water part 55 and the suction part 56 are connected with the ultrasonic probe 53 via the returning-water tube and the suction tube, respectively. The ultrasonic outputting part 57 is also connected with the ultrasonic probe 53 via the ultrasonic drive cable.
[0007]In this conventional example, after powering on, if the ultrasonic probe 53 is connected to the main device 52, the suction part 56 will start suction with the command of the control part 58, and a liquid, an organization, etc. will be sucked from the opening which was provided at the tip of the ultrasonic probe 53 and which is not illustrated. If the ultrasonic pedal 54a of the foot switch 54 is stepped on, the information will be input into the switch detection part 59, and a detection result will be transmitted to the control part 58. The control part 58 gives an operation command to the ultrasonic outputting part 57 and the returning-water part 55.
[0008]The ultrasonic output according to setting out is transmitted to the ultrasonic probe 53, the tip of the ultrasonic probe 53 vibrates, and the ultrasonic outputting part 57 crushes and emulsifies an organization. The returning-water part 55 ejects the liquid for washing an organization from the opening which was provided at the tip of the ultrasonic probe 53 in the water supply quantity according to setting out and which is not illustrated, and the liquid for cooling the ultrasonic probe 53.
[0009]By performing 2 above-mentioned operations simultaneously, crushing, emulsification, and suction work are [an organization] realizable. If the returning-water pedal 54a of the foot switch 54 is stepped on, the information will be input into the switch detection part 59, and a detection result will be transmitted to the control part 58. The control part 58 gives an operation command to the returning-water part 55. A returning-water part ejects the liquid for washing an organization from the opening which was provided at the tip of the ultrasonic probe 53 in the water supply quantity according to 55 setting out and which is not illustrated.
[0010]On the other hand, a high frequency operation system (electrotome) cuts open and solidifies an organization according to the high frequency current. For example, in the bipolar system for brain surgery, while there is a water pipe way and it returns water to bipolar forceps, the high frequency current is outputted.
[0011]The role of the water supplying means at this time is protecting an organization from an extremes-of-temperature rise, and preventing carbonization of an organization by being interlocked with washing of an organization, and the output of the electrotome. Thereby, there is a merit for which an organization becomes difficult to adhere to the electrode of a treatment implement. The composition at this time is high frequency output sections, a returning-water part, and a switch part. However, that in which it is usually most which comprised high frequency output sections and a switch part, and the electrotome provided the returning-water part is marketed as a brain surgery special-purpose machine.
[0012]Fig.8 shows the composition of the conventional electrotome 61 relevant to the present invention. The bipolar forceps 63 which this electrotome 61 is connected to the main device 62 and this main device 62, and deals with incision, coagulation, etc. by the high frequency current, It is connected to the main device 62 and has the foot switch 64 which performs incision by the bipolar forceps 63, and operation of coagulation via this main device 62.
[0013]The returning-water part 65 which returns water in the main device 62, and the high frequency output sections 66 which output the high frequency current, Having the switch detection part 68 which has the control part 67 which controls these, and

detects operation of the coagulation pedal 64a of the foot switch 64, and the incision pedal 64b, the control part 67 controls operation of the returning-water part 65 and the high frequency output sections 67 by the detection result of this switch detection part 68.
[0014]The returning-water part 65 is connected with the bipolar forceps 63 via a returning-water tube, and the high frequency output sections 66 are connected with the bipolar forceps 63 via the high frequency signal cable.
[0015]In this conventional example, if the bipolar forceps 63 is connected to the main device 62 and the incision pedal 64a of the foot switch 64 is stepped on, that information will be input into the switch detection part 68, and a detection result will be transmitted to the control part 67. The control part 67 gives an operation command to the high frequency output sections 66. The high frequency output sections 66 transmit the high frequency output according to setting out to the bipolar forceps 63 a treatment implement and here, and an incision output gives them to an organization from the tip electrode part which is not illustrated.
[0016]If the coagulation pedal 64b of the foot switch 64 is stepped on, the information will be input into the switch detection part 68, and a detection result will be transmitted to the control part 67. The control part 67 gives an operation command to the high frequency output sections 66 and the returning-water part 65.
[0017]The high frequency output sections 66 transmit the high frequency output according to setting out to the bipolar forceps 63 a treatment implement and here, and a coagulation output is given to an organization from the tip electrode part which is not illustrated.
[0018]The returning-water part 65 ejects the water supply quantity according to setting out from the opening at the tip which the bipolar forceps 63 does not illustrate. The coagulation which is not carbonized is attained washing an organization by performing 2 above-mentioned operations simultaneously. Since an organization does not carbonize, an organization does not adhere to the polar zone.
[0019]
[Problem to be solved by the invention]In the actual condition of what is a function in which the returning-water parts 55 and 65 etc. are common in the ultrasonic surgery apparatus 51 and the electrotome 61 of a conventional example as described by Fig.7 and Fig.8, it is marketed as separate equipment, and a user has to stop having to prepare two common functions, it is uneconomical and treatment is restricted.When the thing with the overlapping function was installed, respectively, the problem which becomes narrow also had a way place.
[0020]The present invention was made in view of the point mentioned above, and use independently is aimed at providing an ultrasonic surgery apparatus and a high frequency operation system, and the economical fluid supply recovery system with a wide scope whose gang control is possible from the first.
[0021]
[Means for solving problem]In the fluid supply recovery system provided with the feeding means which supplies a fluid, and the recovery means which carries out suction recovery of the fluid etc., The means of communication which communicates with the ultrasonic surgery apparatus or high frequency operation system connected selectively, In accordance with the classification of the equipment identified by device identification means to identify the classification of the connected equipment, and the aforementioned device identification means, By having provided the control means of the aforementioned feeding means and the recovery means which is interlocked with operation of the aforementioned ultrasonic surgery apparatus or a high frequency operation system, and operates a feeding means at least by communication with the aforementioned ultrasonic surgery apparatus or a high frequency operation system, Use independently can be performed, and as it connected with the equipment with which classification differs and gang control was completed, economical use was completed and the wide scope is secured.
[0022]
[Mode for carrying out the invention]Hereafter, an embodiment of the invention is described with reference to Drawings.
(First embodiment) Fig.1 thru/or Fig.3 start the first embodiment of the present invention, Fig.1 shows the entire configuration of the ultrasonic surgery system provided with the first embodiment, Fig.2 shows the contents of processing of a returning-water suction unit, and Fig.3 shows the contents of processing of an ultrasonic surgery apparatus.
[0023]The ultrasonic surgery apparatus (main part of an ultrasonic surgery apparatus) 2 which the ultrasonic surgery system 1 provided with the first embodiment of the present invention shown in Fig.1 uses an ultrasonic wave, and emulsifies [which emulsifies, and cuts open and solidifies it] it and sucks a body tissue, The returning-water suction unit (main part of a returning-water suction unit) 3 as a fluid supply recovery system (present invention) connected via this ultrasonic surgery apparatus 2 and telecommunication cable 9, It consists of the ultrasonic probe 4 as an ultrasonic treatment part which it is connected with the ultrasonic surgery apparatus 2 and the returning-water suction unit 3, and an operator grips, and performs treatment by an ultrasonic wave, and the foot switch 5 which is connected with the returning-water suction unit 3, for example, and performs control operation of ultrasonic output operation and returning-water operation.
[0024]In this ultrasonic surgery system 1, the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 serve as a separate body. The ultrasonic surgery apparatus 2 shown by Fig.1 is equivalent to the thing which deleted the returning-water part 55 and the suction part 56 from the ultrasonic surgery apparatus 51 shown by Fig.7 and by which functional limitation was carried out.
[0025]Specifically, this ultrasonic surgery apparatus 2 has the ultrasonic outputting part 6 which outputs an ultrasonic wave, the control part 7 which controls operation of this ultrasonic outputting part 6, and the switch detection part 8 which detects the operation switch of the ultrasonic pedal 5a of the foot switch 5, and the returning-water pedal 5b via the returning-water suction unit 3.
[0026]The above-mentioned control part 7 has apparatus connected with the telecommunication cable 9, and the communications department 7a which performs communication of the returning-water suction unit 3 and both directions here. In this communications department 7a, classification of the apparatus of this ultrasonic surgery apparatus 2 is made identifiable, and it has the generating means of the ID information which is also characteristic data. It has the identification device which identifies the classification of the apparatus, etc. by the ID information from the apparatus connected by the telecommunication cable 9. The ultrasonic outputting part 6 is equivalent to conventional ultrasonic coagulotomy equipment, and is constituted from a power supply and a control part required to output an ultrasonic wave, an oscillation part, an outputting part, and a detection part by the ultrasonic outputting part 6.
[0027]The returning-water suction unit 3 has the returning-water part 11 which returns water, the suction part 12 to suck, the control part 13 which controls these, and the switch detection part 14 which detects the operation switch of the foot switch 5 connected to the returning-water suction unit 3. This foot switch 5 is connected to the returning-water suction unit 3 freely

attachable/detachable by the connecting cable 15.
[0028]It is connected freely attachable/detachable between the returning-water suction unit 3 and the ultrasonic surgery apparatus 2, and is connected with the control part 7 of the ultrasonic surgery apparatus 2 by the signal wire 9a of the telecommunication cable 9 which communicates, and the control part 13 of the returning-water suction unit 3. It is connected also with the switch detection part 8 of the ultrasonic surgery apparatus 2 by the signal wire 9b of the telecommunication cable 9.
[0029]The above-mentioned control part 13 has the control part 7 (inner communications department 7a) of the ultrasonic surgery apparatus 2, and the communications department 13a which performs bidirectional communication the apparatus connected with the above-mentioned telecommunication cable 9, and here. In this communications department 13a, classification of the apparatus of this returning-water suction unit 3 is made identifiable, and it has the generating means of the ID information which is also characteristic data. It has the identification device which identifies the classification of the apparatus, etc. by the ID information from the apparatus connected by the telecommunication cable 9 (according to this embodiment). For simplification, ID information comprises a type code part which shows the classification of apparatus, and an ID code part peculiar to that apparatus, and enables classification of apparatus, and identification between the apparatus of the same classification by sending this ID information to the connected apparatus, for example.
[0030]The returning-water suction unit 3 enables it to change the water supply quantity from the returning-water part 11, and the suction quantity (suction force) by the suction part 12 according to the apparatus and the treatment implement which are connected. For this reason, the preset value of the water supply quantity corresponding to the connected apparatus and suction quantity (suction force) is memorized to the storage part 13b which comprises a memory in the control part 13, etc., It displays with the display panel which does not illustrate the used preset value last time when apparatus with the ID code corresponding to the connected apparatus is connected again, and in not changing the displayed preset value, it returns water and sucks with the preset value.
[0031]The above-mentioned ultrasonic probe 4 is connected with the ultrasonic outputting part 6 of the ultrasonic surgery apparatus 2 freely attachable/detachable via the ultrasonic drive cable 16, and this ultrasonic probe 4 is connected with the returning-water part 11 of the returning-water suction unit 3, and the suction part 12 freely attachable/detachable via the returning-water tube 17 and the suction tube 18, respectively.
[0032]When the ultrasonic surgery apparatus 2 is connected, this embodiment, Will be in the ultrasonic surgery apparatus 2 and the state of the gang control of a returning-water sucking function, and by this, Crushing, emulsification, washing, and suction are attained in an organization (it becomes possible to solidify, while in the case of the electrotome it will be in the state of gang control, and only a returning-water function washes an organization and cools by this so that it may describe by a second embodiment).
[0033]As mentioned above, gang control is possible for the ultrasonic surgery system 1 so that the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 may be connected with the telecommunication cable 9 and it may describe below. As for this returning-water suction unit 3, also when a high frequency operation system is connected instead of the ultrasonic surgery apparatus 2, that high frequency operation system and gang control are possible.
[0034]And connection of the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 will begin communication mutually. It is recognized with which apparatus both apparatus of each other is connected now by ID information peculiar to equipment. When it cannot recognize mutually, only operation peculiar to each equipment is carried out, but it is ceased on the other hand, to commit gang control.
[0035]When it transmits and receives mutually for every fixed time and different ID is replied, and when a reply does not come back, ID information is recognized to be a connection abnormality and performs communication error processing. For example, it notifies of warning and operation of equipment stops.
[0036]Next, with reference to Fig.2, the communications processing of the returning-water suction unit 3 of this embodiment is described. A start of communications processing will judge whether as shown in Step S1, the ultrasonic surgery apparatus 3 was connected. That is, the control part 13 of the returning-water suction unit 3 performs bidirectional communication by the apparatus connected to this returning-water suction unit 3 by the communications department 13a via the telecommunication cable 9, The classification of the apparatus judges that it is the ultrasonic surgery apparatus 3 from the ID information replied to the signal which the classification of the other party's apparatus asks.
[0037]It is judged whether there is any change in apparatus ID (ID information) connected as it was shown in Step S2, when the ultrasonic surgery apparatus 3 was connected with this judgment, When there is no change in connected apparatus ID, gang control processing with the ultrasonic surgery apparatus 3 of Step S3 is performed, and it is monitored after processing of this gang control whether there is any change in apparatus ID returned and connected to Step S2.
[0038]And when connected apparatus ID has change, communication error processing of step S4 is performed. As this communication error processing, only the apparatus which the error generated warns of an error display, and the connected apparatus (in this case, ultrasonic surgery apparatus of a different ID code part from the ID code part of a front thing) does not perform an error display only by halting, for example. (And it is based on operation of a reset switch etc.) The connected apparatus is also can be operated after error release.
[0039]It is judged whether the electrotome was connected to the ** case judged that the ultrasonic surgery apparatus 3 is not connected in judgment of Step S1 on the other hand as shown in Step S5, When it is judged that the electrotome is not connected, it is made to make it operate by returning-water suction unit 3 independent one shown in Step S6.
[0040]It judges [whether there is any change in connected apparatus ID which is shown in Step S7 when it is judged in judgment of Step S5 that the electrotome is connected, and], When there is no change in connected apparatus ID, gang control processing with the electrotome of Step S8 is performed, and it is monitored after processing of this gang control whether there is any change in apparatus ID returned and connected to Step S7.
[0041]And when connected apparatus ID has change, communication error processing of step S4 is performed. Although the gang control with this electrotome related to the second embodiment, it was described by Fig.2.
[0042]On the other hand, the ultrasonic surgery apparatus 2 performs communications processing as shown in Fig.3. A start of communications processing will judge whether the returning-water suction unit 3 shown in Step S11 was connected. That is, the other party's apparatus by which the control part 7 of the ultrasonic surgery apparatus 2 was connected to this ultrasonic surgery apparatus 2 by the communications department 7a via the telecommunication cable 9 (in this case) The classification of the apparatus which sent the signal which asks the classification of apparatus and was connected from the information on the type code part of the replied ID information to the returning-water suction unit 3 judges that it is the returning-water suction

unit 3.
[0043]When it is judged by this judgment that the returning-water suction unit 3 is not connected, as it is shown in Step S12, control management independent [ultrasonic surgery apparatus 2] is performed. It judges [whether there is any change in apparatus ID connected as it was shown in Step S13, when it was judged on the other hand that the returning-water suction unit 3 is connected and], When there is no change in connected apparatus ID, gang control processing with the returning-water suction unit 3 of Step S14 is performed, and it is monitored after processing of this gang control whether there is any change in apparatus ID returned and connected to Step S13. And when connected apparatus ID has change, communication error processing of Step S15 is performed. A display is not performed only by only the apparatus which the error generated as this communication error processing was described by Fig.2 performing an error display, and suspending the connected apparatus. The connected apparatus is also can be operated after error release.
[0044]As described with reference to Fig.2 and Fig.3, in this ultrasonic surgery system 1,Identify the classification of the other party's connected apparatus and it enables it to perform control management in conjunction with the apparatus by connection with the telecommunication cable 9, and when not connected, control management apparatus independent [each] is performed.
[0045]Next, operation of gang control is described first. If it recognizes that the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 of each other were connected as mentioned above by both ID information, it will be in the state of gang control. Then, if the ultrasonic probe 4 is connected to the ultrasonic surgery apparatus 2, from the control part 7 of the ultrasonic surgery apparatus 2, it transmits to the control part 13 of the returning-water suction unit 3, and that connection information will send a control signal to the suction part 12, and will carry out the suction drive of this control part.
[0046]And if the ultrasonic pedal 5a of the foot switch 5 is stepped on, the information on the switch ON by the operation to complete will be input into the switch detection part 14 of the returning-water suction unit 3, and the detection result will be transmitted to the control part 13 of the returning-water suction unit 3. The control part 13 of the returning-water suction unit 3 transmits that to the returning-water part 11 of this returning-water suction unit, the control part 7 of the ultrasonic surgery apparatus 2, and the switch detection part 8. The returning-water part 11 ejects the liquid for washing an organization, and the liquid for cooling the ultrasonic probe 4 from the returning-water opening which was provided at the tip of the ultrasonic probe 4 in the water supply quantity according to setting out and which is not illustrated.
[0047]By the control part 7 of the ultrasonic surgery apparatus 2, from the ultrasonic outputting part 6 of this ultrasonic surgery apparatus 2, An ultrasonic driving output is generated, supersonic vibration of the ultrasonic transducer in the ultrasonic probe 4 which is not illustrated is carried out via the ultrasonic drive cable 16, the supersonic vibration is transmited to the ultrasonic treatment part at the tip of the ultrasonic probe 4, by supersonic vibration, it cuts open and solidifies and the organization which pressed the ultrasonic treatment part is emulsified.
[0048]In that case, suction recovery of the liquid to which water was returned, the blood which bled, the crushed explant, etc. is carried out via the suction tube 18 by the suctioning operation by the suction part 12, the excessive fluid of an ultrasonic treatment part periphery is removed promptly, and the state of being easy to continue ultrasonic treatment is maintained.
[0049]If the returning-water pedal 5b of the foot switch 5 is stepped on, the information will be input into the switch detection part 14 of the returning-water suction unit 3, and a detection result will be transmitted to the control part 13 of the returning-water suction unit 3. The control part 13 of the returning-water suction unit 3 transmits that to the returning-water part 11 of the returning-water suction unit 3, and the control part 7 of the ultrasonic surgery apparatus 2.
[0050]The returning-water part 11 ejects the liquid for washing an organization from the returning-water opening which was provided at the tip of the ultrasonic probe 4 in the water supply quantity according to setting out and which is not illustrated. Also in this case, the excessive fluid of an ultrasonic treatment part periphery is promptly removed by the suctioning operation by the suction part 12.
[0051]Thus, by connecting the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 according to this embodiment, By connecting the returning-water suction unit 3, the ultrasonic surgery apparatus 2 which does not have returning water and a suction means will be in the state of interlocking and operating, and will function as the ultrasonic surgery apparatus which has returning water and a suction means similarly.
[0052]When not connecting the ultrasonic surgery apparatus 2 and the returning-water suction unit 3, each can be used as independent apparatus. For example, if it connects the foot switch for ultrasonic coagulotomy to the contact button of the switch detection part 8 in using the ultrasonic surgery apparatus 2 alone (as ultrasonic coagulotomy equipment which does not have a returning-water sucking function), it can be used as ultrasonic coagulotomy equipment.
[0053]This returning-water suction unit 3 can be alone used by not connecting the returning-water suction unit 3 with apparatus, such as the ultrasonic surgery apparatus 2. in this case, the thing for which the foot switch for returning water and suction etc. which are not illustrated to the switch detection part 14 are connected -- as a water conveyance device, it can be used as a suction unit by operation of the foot switch for returning-water suction, and returning water and suctioning operation of this returning-water suction unit 3 can be alone used as a returning-water suction unit.
[0054]the telecommunication cable 9 -- not using it (that is, state where both are not connected) -- the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 can also be used by an independent control state, respectively by using the ultrasonic surgery apparatus 2 and the returning-water suction unit 3. That is, although both do not commit ganged operation using the returning-water suction unit 3 with existing ultrasonic (it does not have returning-water sucking function) coagulotomy equipment (or ultrasonic surgery apparatus 2 used as the same function as this), treatment which is performed by making the function of returning water and suction add can be performed.
[0055]In this case, since both do not interlock, they have to operate each with a foot switch etc. appropriately, but since each is controllable independently, it becomes possible to perform treatment in conditions which differ from the usual gang control largely, and directions for use and the use technique can be increased. On the other hand, in the conventional example of Fig.7, since only the directions for the case where gang control of the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 of Fig.1 is unified and carried out can be done, treatment conditions are restrained.Treatment -- use with a returning-water suction unit independent cannot be performed -- is restrained.
[0056]Thus, according to this embodiment, by connecting the returning-water suction unit 3 to the ultrasonic surgery apparatus 2 with the telecommunication cable 9, the ultrasonic surgery system 1 which uses both interlocking can be constituted, each can also be used alone, and equipment with user-friendly extendibility can be realized.
[0057](Second embodiment) Next, the second embodiment of the present invention is described with reference to Fig.4 and Fig.5.Fig.4 shows the entire configuration of the high frequency operation system of the second embodiment of the present invention, and Fig.5 shows the contents of processing by the side of a high frequency operation system (electrotome).

[0058]The high frequency operation system (electrotome) 22 which the high frequency operation system 21 provided with the second embodiment of the present invention shown in Fig.4 cuts a body tissue open, and solidifies according to the high frequency current, The returning-water suction unit 3 connected via this electrotome 22 and telecommunication cable 9, The bipolar forceps 24 as a bipolar treatment implement of the high-frequency-treatment part which it is connected with the electrotome 22 and the returning-water suction unit 3, and an operator grips, and performs treatment by high frequency, and the shape of tweezers which face across and solidify an organization more specifically, For example, it is connected with the returning-water suction unit 3, and consists of the foot switch 25 for performing control operation of high frequency output operation and returning-water operation. In this high frequency operation system 21, the electrotome 22 and the returning-water suction unit 3 serve as a separate body.
[0059]The electrotome 22 shown by Fig.4 is equivalent to the thing which deleted the returning-water part 65 from the electrotome 61 shown by Fig.8 and by which functional limitation was carried out.Specifically, the electrotome 22 has the high frequency output sections 26 which output high frequency, the control part 27 which controls operation of these high frequency output sections 26, and the switch detection part 28 which detects the operation switch of the incision pedal 25a of the foot switch 25, and the coagulation pedal 25b via the returning-water suction unit 3.
[0060]The above-mentioned control part 27 has apparatus connected with the telecommunication cable 9, and the communications department 27a which performs communication of the returning-water suction unit 3 and both directions here. In this communications department 27a, the classification of the apparatus of this electrotome 22 is possible, and it has the generating means of ID information with characteristic data. It has the identification device which identifies the classification of the apparatus, etc. by the ID information from the apparatus connected by the telecommunication cable 9.
[0061]The high frequency output sections 26 are equivalent to the conventional high frequency operation system, and are constituted from a power supply and a control part required to output high frequency, an oscillation part, an outputting part, and a detection part by these high frequency output sections 26. On the other hand, the returning-water suction unit 3 has composition described by the first embodiment, attaches the same code as a first embodiment, and omits the description.
[0062]It is connected with the high frequency output sections 26 of the electrotome 22 via the high frequency drive cable 31, and the bipolar forceps 24 is connected with the returning-water part 11 of the returning-water suction unit 3 via the returning-water tube 32.
[0063]The electrotome 22 and the returning-water suction unit 3 are connected with the telecommunication cable 9, and gang control is possible also for this embodiment. Next, it came to have described the communications processing by the returning-water suction unit 3 in this embodiment by Fig.2. If it describes simply and the returning-water suction unit 3 will be connected with the electrotome 22, communication will be begun mutually. It is recognized with which apparatus both apparatus owns ID information peculiar to equipment, and is mutually connected now by the ID information.
[0064]When it cannot recognize mutually, only operation peculiar to each equipment is carried out, and gang control is not committed. When it transmits and receives mutually for every fixed time and different ID information is replied, or when a reply does not come back, ID information is recognized to be a connection abnormality, and notifies of warning as communication error processing, and operation of equipment stops it.
[0065]On the other hand, the communications processing by the electrotome 22 comes to be shown in Fig.5. The processing shown in Fig.5 serves as contents replaced by the electrotome independent control management shown by step S12' instead of Step S12 in processing of Fig.3, and since others are the same, they attach the same code, and they omit the description.
[0066]Next, the operation in the case of the gang control recognized that the returning-water suction unit 3 of each other was connected with the electrotome 22 by ID information is described. If the incision pedal 25a of the foot switch 25 is stepped on, the information will be input into the switch detection part 14 of the returning-water suction unit 3, and a detection result will be transmitted to the control part 13 of the returning-water suction unit 3.
[0067]The control part 13 of the returning-water suction unit 3 transmits the information to the control part 27 of the electrotome 22. The control part 27 of the electrotome 22 is transmitted to the high frequency output sections 26 of the electrotome 22, between the two-electrodes parts which the tip of the bipolar forceps 24 does not illustrate, the high frequency current is outputted through the organization across which it faced in the two-electrodes part, and the measures of incision are taken.
[0068]If the coagulation pedal 25b of the foot switch 25 is stepped on, the information will be input into the switch detection part 14 of the returning-water suction unit 3, and a detection result will be transmitted to the control part 13 of the returning-water suction unit 3. The control part 13 of the returning-water suction unit 3 transmits the information to the control part 27 and the switch detection part 28 of the electrotome 22.
[0069]The control part 27 of the electrotome 22 transmits the information to the high frequency output sections 26 of the electrotome 22, between the two-electrodes parts which the tip of the bipolar forceps 24 does not illustrate, the high frequency current is outputted through the organization across which it faced in the two-electrodes part, and the measures of coagulation are taken. Simultaneously, the control part 13 of the returning-water suction unit 3 transmits the information to the returning-water part 11 of the returning-water suction unit 3, and a liquid is ejected from the returning-water opening which the tip of the bipolar forceps 24 does not illustrate.
[0070]if it is made not to connect the telecommunication cable 9 on the other hand -- the electrotome 22 and the returning-water suction unit 3 -- each can be used independently and directions for use and use ****** can be increased. Although described by the case where the apparatus (equipment) connected as mentioned above is the electrotome 22, others have the same effect as the case of a first embodiment.
[0071]And by setting to one the returning-water suction means which can be commonalized from the 1st and a second embodiment, and enabling it to recognize a connection partner, the number of units can be reduced and equipment can be used efficiently.
[0072]Since it is connectable with the ultrasonic surgery apparatus 2, the electrotome 22, and both, the returning-water suction unit 3 can be saved also economically and in space.
[0073]Since it distinguishes to the ultrasonic surgery apparatus 2, the electrotome 22, and which the returning-water suction unit 3 was connected and only the required function of the returning-water suction unit 3 operates based on the information, the user-friendly (operativity) use of a user is attained by easy operation.
[0074](A 3rd embodiment) Next, a 3rd embodiment of the present invention is described with reference to Fig.6. In the description of the above-mentioned 1st or second embodiment, The foot switch 5 for ultrasonic surgery and the foot switch 25 for electrotome which are connected to the returning-water suction unit 3, Connector form differs from signal wiring and it is to

the returning-water suction unit 3 (for example, where the ultrasonic surgery apparatus 2 is connected with the telecommunication cable 9). as [connect / accidentally / instead of the foot switch 5 for ultrasonic surgery being connected / the foot switch 25 for electrotome] -- erroneous connection is carried out and it operates. It enables it to prevent by this the malfunction (control) which is not meant. Although this can secure safety, there are also inconvenient surfaces, such as cost increase by enabling it to connect that from which two or more connector form differs, or the number of signal wiring increasing etc.

[0075]In the high frequency operation system 21 of Fig.4 high frequency operation system 21' provided with this embodiment, When the generating means of ID for identification is provided to the foot switch 25 for electrotome and it is connected to the returning-water suction unit 3, it enables it to recognize that the connected foot switch is the foot switch 25 for electrotome etc. In Fig.6, although the case of the foot switch 25 for electrotome was shown, the generating means of ID for identification is provided also like the foot switch for ultrasonic surgery.

[0076]The identification resistance 33 is attached, for example in the foot switch 25, constant current flows there from the constant current source 34 provided to the returning-water suction unit 3, and an identifying method identifies what type of foot switch it is with the voltage level generated in the identification resistance 33.

[0077]When the ultrasonic surgery apparatus 2 and the returning-water suction unit 3 are connected and the foot switch 25 for an electrosurgery operation is connected by this, for example, Since it is a model from which the ultrasonic surgery apparatus 2 and the foot switch 25 differ, a user is notified of warning and that and it urges connecting a right foot switch.

[0078]By classification of a foot switch, an ultrasonic surgery apparatus fork end changes the wiring which transmits to the switch detection part 8 of the electrotome 22, or 28 from the returning-water suction unit 3, and an ultrasonic surgery apparatus fork end becomes controllable about the electrotome 22.

[0079]Thereby, the control part 13 and ultrasonic surgery apparatus fork end of the returning-water suction unit 3 can make the same the connector of the cable which connects the switch detection part 8 of the electrotome 22, or 28, and there is an advantage which does not need to be exchanged one by one depending on the model to connect. Others have the same effect as the 1st or a second embodiment.

[0080]In the case of a foot switch, in ****, it described as a switching means connected to the returning-water suction unit 3, but it may not limit to a foot switch and remote switches, such as other switches, for example, a hand switch etc., may be used.

[0081][Additional remark]

1. In fluid supply recovery system provided with feeding means which supplies fluid, and recovery means which carries out suction recovery of fluid etc., The means of communication which communicates with the ultrasonic surgery apparatus or high frequency operation system connected selectively, In accordance with the classification of the equipment identified by device identification means to identify the classification of the connected equipment, and the aforementioned device identification means, A fluid supply recovery system having a control means of the aforementioned feeding means and a recovery means which is interlocked with operation of the aforementioned ultrasonic surgery apparatus or a high frequency operation system, and operates a feeding means at least by communication with the aforementioned ultrasonic surgery apparatus or a high frequency operation system.

2. Means of communication which connects and communicates with ultrasonic surgery apparatus or high frequency operation system, A device identification means to identify the classification of the connected equipment, and the feeding means which supplies a fluid to the treatment part of the aforementioned ultrasonic surgery apparatus or the aforementioned high frequency operation system, The recovery means which collects the fluid supplied to the treatment part of the aforementioned ultrasonic surgery apparatus or the aforementioned high frequency operation system, organizations, etc., The control means which is interlocked with operation of the aforementioned ultrasonic surgery apparatus or a high frequency operation system, and operates the aforementioned feeding means and a recovery means by communication with the aforementioned ultrasonic surgery apparatus or a high frequency operation system in accordance with the classification of the equipment identified by the aforementioned device identification means, A fluid supply recovery system characterized by preparation ******.

[0082]3. Means which has peculiar ID information of each apparatus (equipment) in returning-water suction unit, ultrasonic surgery apparatus, and electrosurgery operation system, In the operation system 4. additional remark 3 which performs motion control based on the result of the identification detection means for identifying ID of the apparatus connected when other apparatus was connected, and an identification detection means, The operation system with which gang control of an ultrasonic output means, water supplying means, and the suction means is carried out when a returning-water suction unit and an ultrasonic surgery apparatus are connected.

[0083]5. Operation system with which gang control of high frequency output means and water supplying means is carried out in additional remark 3 when returning-water suction unit and electrosurgery operation system are connected.

6. Returning-water suction unit, ultrasonic surgery apparatus, electrosurgery operation system which distinguish by ID of which apparatus foot switch with ID information for distinguishing whether they are foot switch for ultrasonic surgery and foot switch for electrosurgery operation and connected foot switch are things.

[0084]

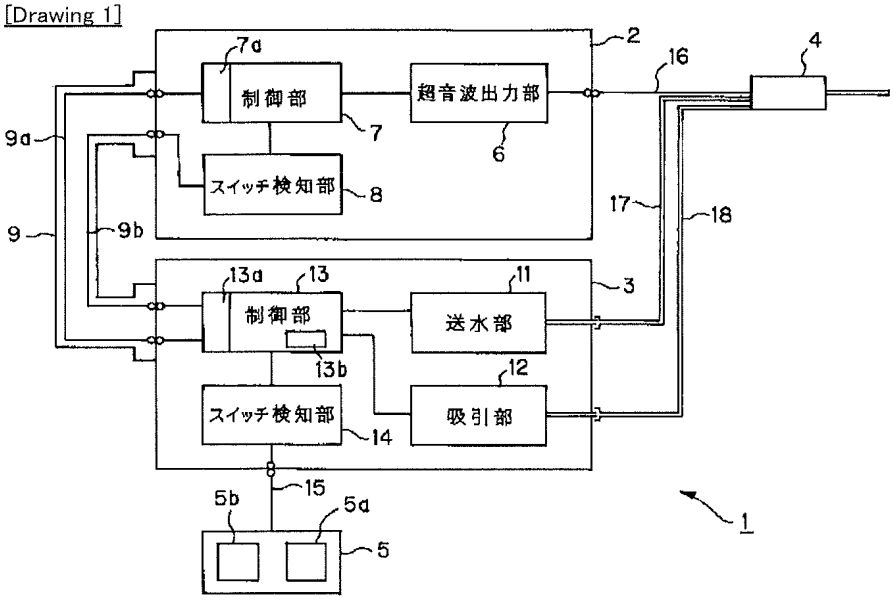
[Effect of the Invention]In the fluid supply recovery system which was provided with the feeding means which supplies a fluid, and the recovery means which carries out suction recovery of the fluid etc. according to the present invention as described above, The means of communication which communicates with the ultrasonic surgery apparatus or high frequency operation system connected selectively, In accordance with the classification of the equipment identified by device identification means to identify the classification of the connected equipment, and the aforementioned device identification means, Since the control means of the aforementioned feeding means and the recovery means which is interlocked with operation of the aforementioned ultrasonic surgery apparatus or a high frequency operation system, and operates a feeding means at least is provided by communication with the aforementioned ultrasonic surgery apparatus or a high frequency operation system, Use independently can be performed, and as it connects with the equipment with which classification differs and gang control is possible, economical use can be performed and a wide scope can be secured.

[Translation done.]

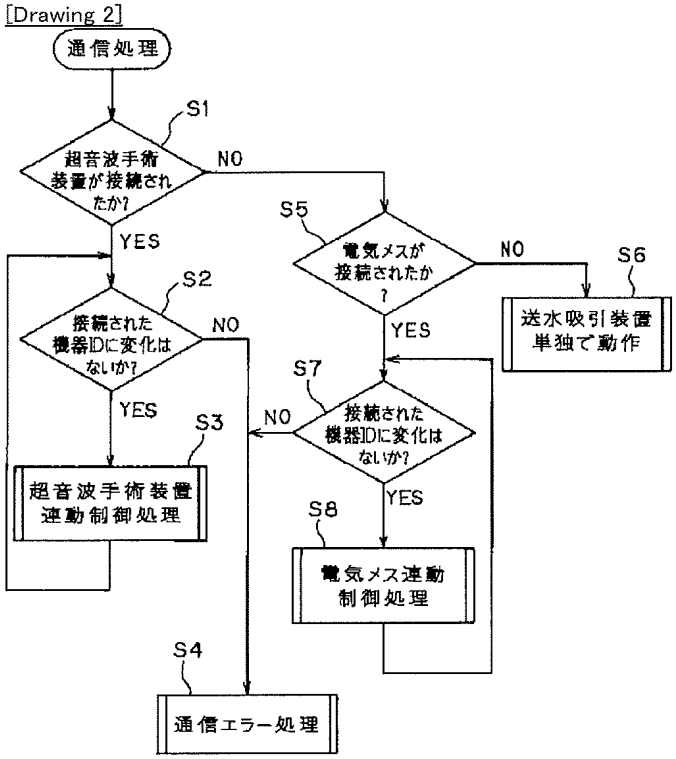
* NOTICES *

DRAWINGS

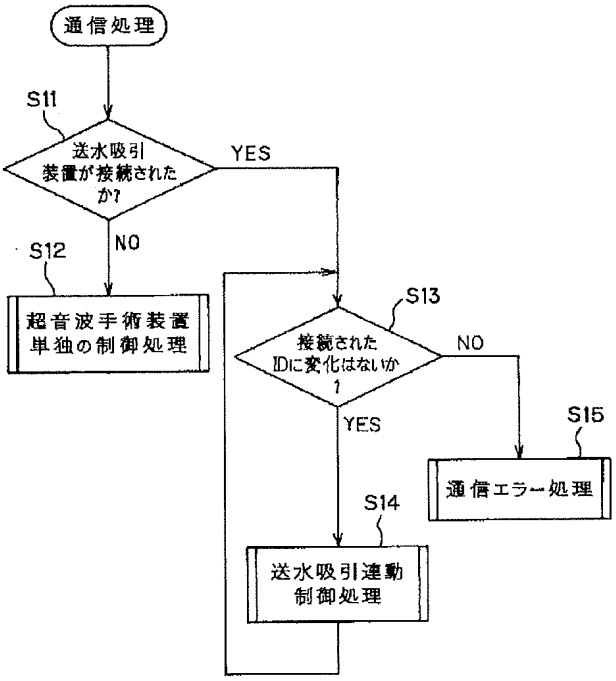
[Drawing 1]



[Drawing 2]



[Drawing 3]



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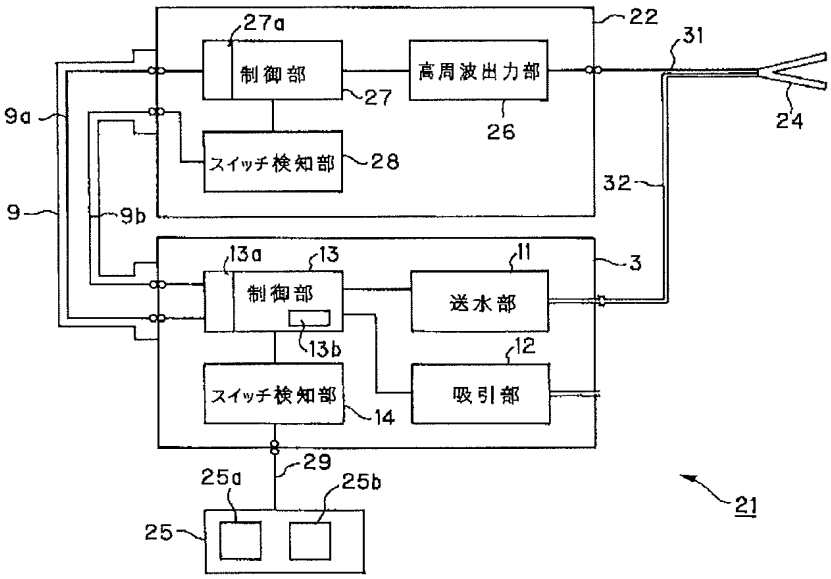

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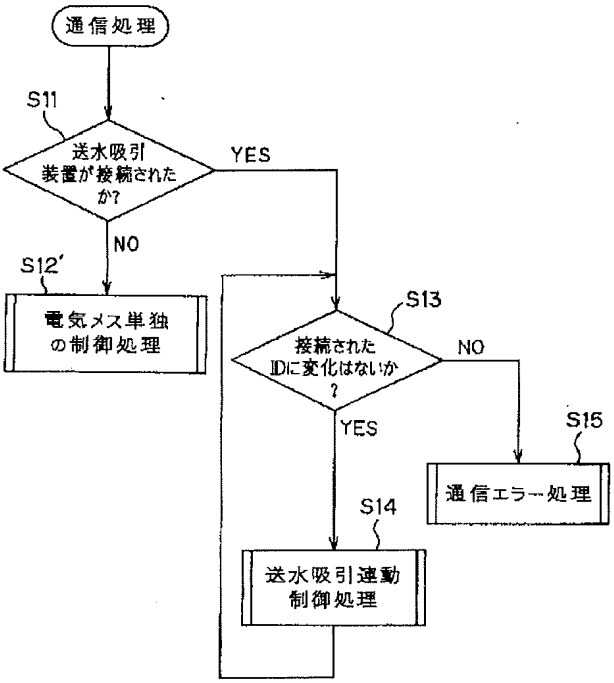
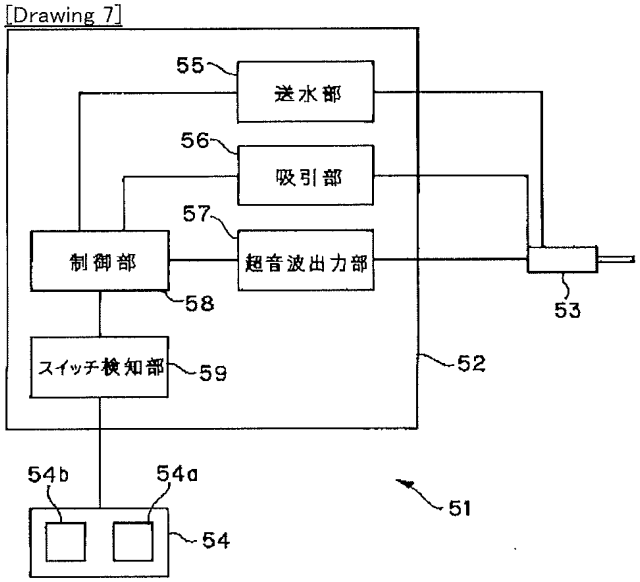
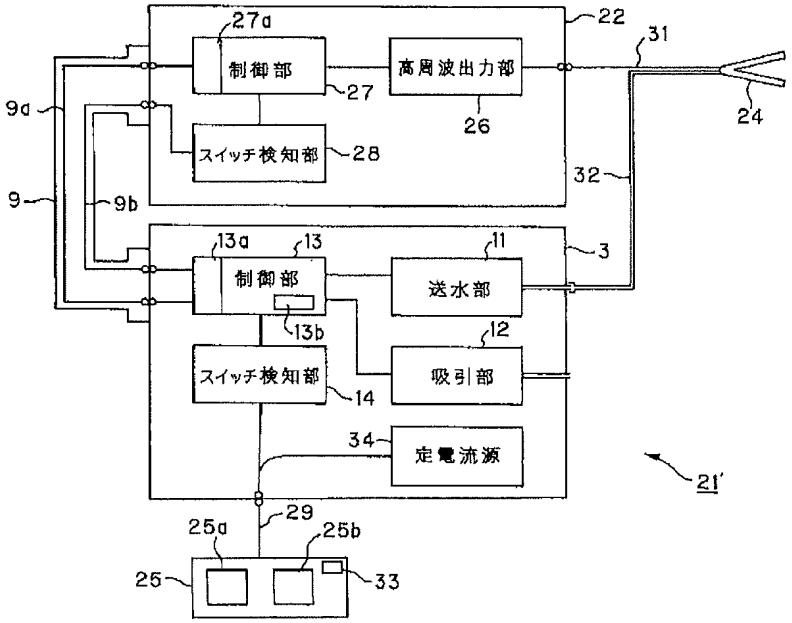


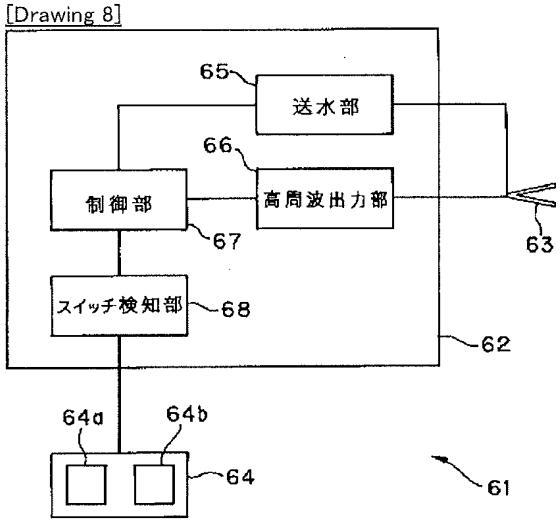
[Drawing 7]



[Drawing 6]



[Drawing 8]



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	18/00			17/36	３３０	
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					３２０	

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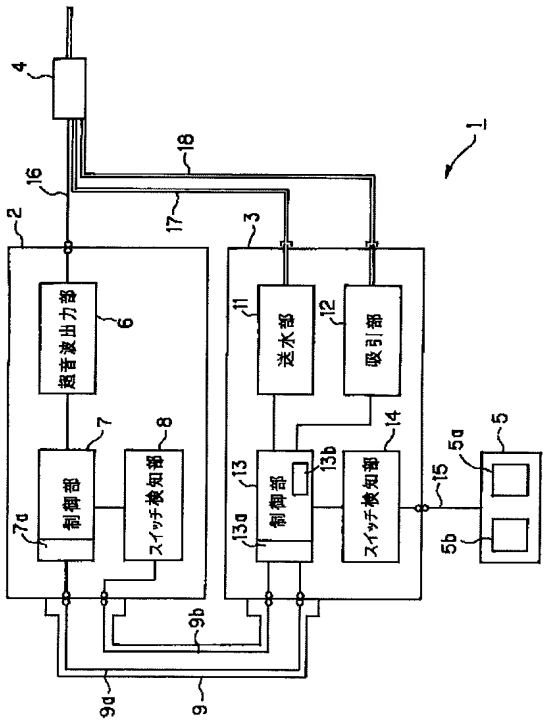
Ｆターム(参考)　4C060 JJ15 JJ17 JJ24 JJ25 KK03 KK04 KK10 KK15 KK22 MM24

(54)【発明の名称】　流体供給回収装置

(57)【要約】
【課題】　単独での使用はもとより、超音波手術装置及び高周波手術装置と連動制御ができる経済的、かつ適用範囲が広い流体供給回収装置を提供する。
【解決手段】　送水を行う送水部１１と吸引を行う吸引部１２とを制御部１３で制御し、単独での使用の他に、通信ケーブル９により超音波手術装置２が接続されると、両者でＩＤ情報を送受する通信により、接続された装置機種を認識して連動制御状態となり、例えばフットスイッチ５の超音波ペダル５ａを踏む操作を行うと、超音波手術装置２は超音波プローブ４に超音波駆動する出力信号を出力すると共に、送水吸引装置３は送水部１１から液体を超音波プローブ４の先端開口から射出するように両装置が連動して働くようにした。



1

【特許請求の範囲】

【請求項１】　流体を供給する供給手段と、流体等を吸引回収する回収手段とを備えた流体供給回収装置において、

選択的に接続される超音波手術装置または高周波手術装置と通信する通信手段と、

接続された装置の種別を識別する装置識別手段と、

前記装置識別手段によって識別された装置の種別に合わせて、前記超音波手術装置または高周波手術装置との通信により前記供給手段および回収手段の少なくとも供給手段を前記超音波手術装置または高周波手術装置の動作に連動して動作させる制御手段と、

を備えたことを特徴とする流体供給回収装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は接続される超音波手術装置または高周波手術装置と連動して流体等の供給、回収動作が可能な流体供給回収装置に関する。

【０００２】

【従来の技術】近年、外科手術を行うために超音波による超音波手術装置や高周波電流を通電して処置を行う高周波手術装置（電気メス）が広く用いられるようになった。例えば、特開平６－３８９７３号の超音波手術装置では、超音波振動をプローブに伝え、組織を破砕、乳化、吸引する装置であり、主に超音波出力部、送水吸引部、スイッチ部から構成されている。

【０００３】このとき、送水吸引部の役割は、組織を洗滌するため、プローブを冷却するため、乳化した組織及び洗滌液（冷却液）を回収するためのものである。又、最近では、特開平９－３８０９８号に開示されているように送水吸引機能のない超音波出力部、スイッチ部から構成される超音波凝固切開装置もある。

【０００４】図７は本発明に関連する従来の超音波手術装置５１の構成を示す。この超音波手術装置５１は装置本体５２と、この装置本体５２に接続され、術者が把持して超音波を利用した手術を行う超音波プローブ５３と、装置本体５２に接続され、この装置本体５２を介して超音波プローブ５３に超音波出力のＯＮ／ＯＦＦ等を制御する操作を行うフットスイッチ５４とを有する。

【０００５】装置本体５２内には送水を行う送水部５５と、吸引を行う吸引部５６と、超音波を出力する超音波出力部５７と、これらを制御する制御部５８とを有し、また、フットスイッチ５４の超音波ペダル５４ａ及び送水ペダル５４ｂの操作を検知するスイッチ検知部５９とを有し、このスイッチ検知部５９の検出結果により制御部５８は送水部及び超音波出力部５８の動作を制御する。

【０００６】また、送水部５５と吸引部５６とはそれぞれ送水チューブ及び吸引チューブを介して超音波プローブ５３と接続されている。また、超音波出力部５７も超音波駆動ケーブルを介して超音波プローブ５３と接続されている。

2

【０００７】この従来例では、電源投入後、超音波プローブ５３が装置本体５２に接続されると、制御部５８の命令により吸引部５６が吸引を開始し、超音波プローブ５３の先端に設けられた図示しない開口部より、液体、組織等を吸引する。フットスイッチ５４の超音波ペダル５４ａが踏まれたら、その情報がスイッチ検知部５９に入力され、検知結果が制御部５８に伝えられる。制御部５８は、超音波出力部５７及び送水部５５に動作命令を出す。

【０００８】超音波出力部５７は設定に応じた超音波出力を超音波プローブ５３に伝え、超音波プローブ５３の先端が振動し、組織を破砕、乳化する。送水部５５は設定に応じた送水量を超音波プローブ５３の先端に設けられた図示しない開口部より組織を洗滌するための液体、かつ超音波プローブ５３を冷却するための液体を射出する。

【０００９】上記ふたつの動作を同時に行うことにより、組織を破砕、乳化、吸引作業を実現できる。又、フットスイッチ５４の送水ペダル５４ａが踏まれたら、その情報がスイッチ検知部５９に入力され、検知結果が制御部５８に伝えられる。制御部５８は、送水部５５に動作命令を出す。送水部は５５設定に応じた送水量を超音波プローブ５３の先端に設けられた図示しない開口部より組織を洗滌するための液体を射出する。

【００１０】一方、高周波手術装置（電気メス）は、高周波電流により組織を切開、凝固させるものである。例えば、脳外科用のバイポーラシステムでは、バイポーラフォーセプスに送水管路があり、送水しながら高周波電流を出力する。

【００１１】このときの送水手段の役割は、組織の洗滌、電気メスの出力と連動することにより組織を過度の温度上昇から保護し、組織の炭化を防止することである。又、これにより、組織が処置具の電極に付着しにくくなるメリットがある。このときの構成は、高周波出力部、送水部、スイッチ部である。但し、電気メスは通常、高周波出力部、スイッチ部から構成されたものがほとんどで、送水部を設けたものは、脳外科専用機として市販されている。

【００１２】図８は本発明に関連する従来の電気メス６１の構成を示す。この電気メス６１は装置本体６２と、この装置本体６２に接続され、高周波電流で切開、凝固等の処置を行う例えばバイポーラフォーセプス６３と、装置本体６２に接続され、この装置本体６２を介してバイポーラフォーセプス６３による切開、凝固の操作を行うフットスイッチ６４とを有する。

【００１３】装置本体６２内には送水を行う送水部６５と、高周波電流を出力する高周波出力部６６と、これらを制御する制御部６７とを有し、また、フットスイッチ

６４の凝固ペダル６４ａ及び切開ペダル６４ｂの操作を検知するスイッチ検知部６８とを有し、このスイッチ検知部６８の検出結果により制御部６７は送水部６５及び高周波出力部６７の動作を制御する。

【００１４】また、送水部６５は送水チューブを介してバイポーラフォーセプス６３と接続され、高周波出力部６６は高周波信号ケーブルを介してバイポーラフォーセプス６３と接続されている。

【００１５】この従来例では装置本体６２にバイポーラフォーセプス６３が接続されて、フットスイッチ６４の切開ペダル６４ａが踏まれたら、その情報がスイッチ検知部６８に入力され、検知結果が制御部６７に伝えられる。制御部６７は、高周波出力部６６に動作命令を出す。高周波出力部６６は設定に応じた高周波出力を処置具、ここではバイポーラフォーセプス６３に伝え、図示しない先端電極部より組織に切開出力が与える。

【００１６】フットスイッチ６４の凝固ペダル６４ｂが踏まれたら、その情報がスイッチ検知部６８に入力され、検知結果が制御部６７に伝えられる。制御部６７は、高周波出力部６６及び送水部６５に動作命令を出す。

【００１７】高周波出力部６６は、設定に応じた高周波出力を処置具、ここではバイポーラフォーセプス６３に伝え、図示しない先端電極部より組織には凝固出力が与えられる。

【００１８】送水部６５は、設定に応じた送水量をバイポーラフォーセプス６３の図示しない先端の開口部より射出する。上記ふたつの動作を同時に行うことにより、組織を洗滌しながら、炭化させない凝固が可能となる。又、組織が炭化しないことから、電極部に組織が付着しない。

【００１９】

【発明が解決しようとする課題】図７及び図８で説明したように従来例の超音波手術装置５１及び電気メス６１では送水部５５、６５等が共通する機能であるものの、現状では別々の装置として市販されており、ユーザは共通する機能を２つ準備しなければならなくなり、不経済であるし、処置が制限される。また、重複する機能を持ったものをそれぞれ設置すると、術場が狭くなる問題もあった。

【００２０】本発明は、上述した点に鑑みてなされたもので、単独での使用はもとより、超音波手術装置及び高周波手術装置と連動制御ができる経済的、かつ適用範囲が広い流体供給回収装置を提供することを目的とする。

【００２１】

【課題を解決するための手段】流体を供給する供給手段と、流体等を吸引回収する回収手段とを備えた流体供給回収装置において、選択的に接続される超音波手術装置または高周波手術装置と通信する通信手段と、接続された装置の種別を識別する装置識別手段と、前記装置識別手段によって識別された装置の種別に合わせて、前記超音波手術装置または高周波手術装置との通信により前記供給手段および回収手段の少なくとも供給手段を前記超音波手術装置または高周波手術装置の動作に連動して動作させる制御手段と、を設けたことにより、単独での使用ができると共に、種別が異なる装置に接続して連動制御ができるようにして、経済的な使用ができ、かつ広い適用範囲を確保している。

【００２２】

【発明の実施の形態】以下、図面を参照して本発明の実施の形態を説明する。

（第１の実施の形態）図１ないし図３は本発明の第１の実施の形態に係り、図１は第１の実施の形態を備えた超音波手術システムの全体構成を示し、図２は送水吸引装置の処理内容を示し、図３は超音波手術装置の処理内容を示す。

【００２３】図１に示す本発明の第１の実施の形態を備えた超音波手術システム１は超音波を利用して生体組織を切開、凝固、乳化、吸引する超音波手術装置（超音波手術装置本体）２と、この超音波手術装置２と通信ケーブル９を介して接続される（本発明の）流体供給回収装置としての送水吸引装置（送水吸引装置本体）３と、超音波手術装置２及び送水吸引装置３と接続され、術者が把持して超音波による処置を行う超音波処置部としての超音波プローブ４と、例えば送水吸引装置３と接続され、超音波出力動作及び送水動作の制御操作を行うフットスイッチ５とからなる。

【００２４】この超音波手術システム１では超音波手術装置２と送水吸引装置３が別体となったものである。また、図１で示す超音波手術装置２は、図７で示す超音波手術装置５１から送水部５５及び吸引部５６を削除した機能限定されたものに相当する。

【００２５】具体的には、この超音波手術装置２は超音波を出力する超音波出力部６と、この超音波出力部６等の動作を制御する制御部７と、送水吸引装置３を介してフットスイッチ５の超音波ペダル５ａ及び送水ペダル５ｂのスイッチ操作を検出するスイッチ検知部８とを有する。

【００２６】上記制御部７は、通信ケーブル９で接続される機器、ここでは送水吸引装置３と双方向の通信を行う通信部７ａを有する。また、この通信部７ａ内には、この超音波手術装置２の機器の種別を識別可能にすると共に、固有情報でもあるＩＤ情報の発生手段を備えている。また、通信ケーブル９により接続される機器からのＩＤ情報により、その機器の種別等を識別する識別手段を備えている。また、超音波出力部６は、従来の超音波凝固切開装置に相当するものであり、超音波出力部６には、超音波を出力するのに必要な、電源、制御部、発振部、出力部、検知部から構成されている。

【００２７】また、送水吸引装置３は送水を行う送水部

１１と、吸引を行う吸引部１２と、これらを制御する制御部１３と、送水吸引装置３に接続されるフットスイッチ５のスイッチ操作を検知するスイッチ検知部１４とを有する。このフットスイッチ５は接続ケーブル１５により、送水吸引装置３に着脱自在に接続される。

【００２８】送水吸引装置３の制御部１３は送水吸引装置３及び超音波手術装置２間で着脱自在に接続され、通信を行う通信ケーブル９の信号線９ａにより超音波手術装置２の制御部７と接続されると共に、通信ケーブル９の信号線９ｂにより超音波手術装置２のスイッチ検知部８とも接続される。

【００２９】上記制御部１３は、上記通信ケーブル９で接続される機器、ここでは超音波手術装置２の制御部７（内の通信部７ａ）と双方向の通信を行う通信部１３ａを有する。また、この通信部１３ａ内には、この送水吸引装置３の機器の種別を識別可能とすると共に、固有情報でもあるＩＤ情報の発生手段を備えている。また、通信ケーブル９により接続される機器からのＩＤ情報により、その機器の種別等を識別する識別手段を備えている（本実施の形態では、簡単化のため、例えばＩＤ情報は機器の種別を示す種別コード部とその機器固有のＩＤコード部とから構成され、接続された機器に対し、このＩＤ情報を送ることにより、機器の種別と同じ種別の機器間での識別を可能とする）。

【００３０】また、送水吸引装置３は接続される機器及び処置具に応じて、送水部１１からの送水量、吸引部１２による吸引量（吸引圧）を変更できるようにしている。このため、接続された機器に対応した送水量、吸引量（吸引圧）の設定値を制御部１３内のメモリ等で構成される記憶部１３ｂに記憶しておき、接続された機器に対応したＩＤコードを持つ機器が再度、接続された場合に、前回、使用された設定値を図示しない表示パネルで表示し、その表示した設定値を変更しない場合にはその設定値で送水、吸引する。

【００３１】上記超音波プローブ４は超音波駆動ケーブル１６を介して超音波手術装置２の超音波出力部６と着脱自在に接続され、またこの超音波プローブ４は送水吸引装置３の送水部１１及び吸引部１２とそれぞれ送水チューブ１７及び吸引チューブ１８を介して着脱自在に接続される。

【００３２】本実施の形態は超音波手術装置２が接続された場合には、超音波手術装置２と送水吸引機能の連動制御の状態となり、これにより、組織を破砕、乳化、洗滌、吸引が可能となる（第２の実施の形態で説明するように電気メスの場合、送水機能のみが連動制御の状態となりこれにより、組織を洗滌、冷却しながら凝固することが可能となる）。

【００３３】上述のように超音波手術システム１は超音波手術装置２と送水吸引装置３とが通信ケーブル９で接続され、以下に説明するように連動制御が可能となっている。なお、この送水吸引装置３は超音波手術装置２の代わりに高周波手術装置が接続された場合にも、その高周波手術装置と連動制御が可能になっている。

【００３４】そして、超音波手術装置２と送水吸引装置３が接続されると、互いに通信を始める。両機器は装置固有のＩＤ情報により、互いに今どの機器と接続されているかを認識する。一方、互いに認識できない場合は、各装置固有の動作しかせず、連動制御は働かないようになる。

【００３５】ＩＤ情報は一定期間ごとに互いに送受信して、異なったＩＤが返信された場合及び返信が帰ってこない場合は、接続異常と認識して、通信エラー処理を実行する。例えば、警告を告知し、装置の動作が停止する。

【００３６】次に図２を参照して本実施の形態の送水吸引装置３の通信処理を説明する。通信処理が開始すると、ステップＳ１に示すように超音波手術装置３が接続されたか否かの判断を行う。つまり、送水吸引装置３の制御部１３は通信部１３ａにより、この送水吸引装置３に通信ケーブル９を介して接続された機器とで双方向の通信を行い、相手方の機器の種別の問い合わせる信号に対し、返信されるＩＤ情報からその機器の種別が超音波手術装置３か否かの判断を行う。

【００３７】この判断で、超音波手術装置３が接続された場合にはステップＳ２に示すように接続された機器ＩＤ（ＩＤ情報）に変化がないか否かの判断を行い、接続された機器ＩＤに変化がない場合には、ステップＳ３の超音波手術装置３との連動制御処理を行い、この連動制御の処理の後、ステップＳ２に戻り、接続された機器ＩＤに変化がないかをモニタする。

【００３８】そして、接続された機器ＩＤに変化がある場合には、ステップＳ４の通信エラー処理を行う。この通信エラー処理としては、例えば、エラーが発生した機器のみがエラー表示の警告を行い、接続された機器（この場合には、前のもののＩＤコード部とは異なるＩＤコード部の超音波手術装置）は一時停止するのみでエラー表示は行わない。（そして、リセットスイッチ等の操作による）エラー解除後、接続された機器も動作可能となる。

【００３９】一方、ステップＳ１の判断において、超音波手術装置３が接続されていないと判断したた場合にはステップＳ５に示すように電気メスが接続されたか否かを判断し、電気メスが接続されていないと判断した場合にはステップＳ６に示す送水吸引装置３単独で動作させるようにする。

【００４０】また、ステップＳ５の判断において、電気メスが接続されていると判断した場合にはステップＳ７に示す接続された機器ＩＤに変化がないか否か判断を行い、接続された機器ＩＤに変化がない場合には、ステップＳ８の電気メスとの連動制御処理を行い、この連動制

御の処理の後、ステップＳ７に戻り、接続された機器ＩＤに変化がないかをモニタする。

【００４１】そして、接続された機器ＩＤに変化がある場合には、ステップＳ４の通信エラー処理を行う。なお、この電気メスとの連動制御は第２の実施の形態に関連するが図２で説明した。

【００４２】一方、超音波手術装置２は図３に示すような通信処理を行う。通信処理が開始すると、ステップＳ１１に示す送水吸引装置３が接続されたか否かの判断を行う。つまり、超音波手術装置２の制御部７は通信部７ａにより、この超音波手術装置２に通信ケーブル９を介して接続された相手方の機器（この場合には、送水吸引装置３）に対し、機器の種別を問い合わせる信号を送り、返信されたＩＤ情報の種別コード部の情報から接続された機器の種別が送水吸引装置３か否かの判断を行う。

【００４３】この判断で、送水吸引装置３が接続されていないと判断した場合にはステップＳ１２に示すように超音波手術装置２単独の制御処理を行う。一方、送水吸引装置３が接続されていると判断した場合にはステップＳ１３に示すように接続された機器ＩＤに変化がないか否か判断を行い、接続された機器ＩＤに変化がない場合には、ステップＳ１４の送水吸引装置３との連動制御処理を行い、この連動制御の処理の後、ステップＳ１３に戻り、接続された機器ＩＤに変化がないかをモニタする。そして、接続された機器ＩＤに変化がある場合には、ステップＳ１５の通信エラー処理を行う。この通信エラー処理は図２で説明したように例えば、エラーが発生した機器のみがエラー表示を行い、接続された機器は一時停止するのみで表示は行わない。エラー解除後、接続された機器も動作可能となる。

【００４４】図２及び図３を参照して説明したように、この超音波手術システム１では、通信ケーブル９での接続により、接続された相手方の機器の種別を識別し、その機器と連動して制御処理を行うことができるようにすると共に、接続されていない場合にはそれぞれの機器単独での制御処理を行う。

【００４５】次にまず、連動制御の動作を説明する。上述のように超音波手術装置２と送水吸引装置３が互いに接続されたことを両者のＩＤ情報により認識すると、連動制御の状態となる。その後、超音波プローブ４を超音波手術装置２に接続すると、その接続情報が超音波手術装置２の制御部７から、送水吸引装置３の制御部１３に伝えられ、この制御部は吸引部１２に制御信号を送り、吸引駆動させる。

【００４６】そして、フットスイッチ５の超音波ペダル５ａが踏まれると、その踏む操作によるスイッチＯＮの情報が送水吸引装置３のスイッチ検知部１４に入力され、その検知結果が送水吸引装置３の制御部１３に伝えられる。送水吸引装置３の制御部１３は、この送水吸引装置の送水部１１と超音波手術装置２の制御部７及びスイッチ検知部８にその旨を伝える。送水部１１は、設定に応じた送水量を超音波プローブ４の先端に設けられた図示しない送水開口部より、組織を洗滌するための液体、かつ超音波プローブ４を冷却するための液体を射出する。

【００４７】又、超音波手術装置２の制御部７により、この超音波手術装置２の超音波出力部６から、超音波駆動出力を発生し、超音波駆動ケーブル１６を介して超音波プローブ４内の図示しない超音波振動子を超音波振動させ、その超音波振動をその超音波プローブ４の先端の超音波処置部に伝達し、超音波処置部を押し当てた組織を超音波振動で切開、凝固、乳化等する。

【００４８】その際、送水された液体や、出血した血液、破砕された組織片等が吸引部１２による吸引動作により、吸引チューブ１８を介して吸引回収され、超音波処置部周辺の余分な流体等は速やかに除去され、超音波処置を続行し易い状態が維持される。

【００４９】また、フットスイッチ５の送水ペダル５ｂが踏まれると、その情報が送水吸引装置３のスイッチ検知部１４に入力され、検知結果が送水吸引装置３の制御部１３に伝えられる。送水吸引装置３の制御部１３は、送水吸引装置３の送水部１１、超音波手術装置２の制御部７にその旨を伝える。

【００５０】送水部１１は、設定に応じた送水量を超音波プローブ４の先端に設けられた図示しない送水開口部より、組織を洗滌するための液体を射出する。この場合にも、吸引部１２による吸引動作により超音波処置部周辺の余分な流体等は速やかに除去される。

【００５１】このように、本実施の形態によれば、超音波手術装置２と送水吸引装置３を接続することにより、送水及び吸引手段を有しない超音波手術装置２は送水吸引装置３を接続することにより連動して動作する状態となり、送水及び吸引手段を有する超音波手術装置と同様に機能する。

【００５２】また、超音波手術装置２と送水吸引装置３を接続しない場合にはそれぞれを単独の機器として使用できる。例えば、超音波手術装置２を（送水吸引機能を有しない超音波凝固切開装置として）単独で使用する場合には、スイッチ検知部８の接続端子に超音波凝固切開用のフットスイッチを接続すれば、超音波凝固切開装置として使用することができる。

【００５３】また、送水吸引装置３を超音波手術装置２等の機器と接続しないことにより、この送水吸引装置３を単独で使用できる。この場合には、スイッチ検知部１４に図示しない送水及び吸引用フットスイッチ等を接続することにより、この送水吸引装置３の送水及び吸引動作を送水吸引用フットスイッチの操作で送水装置として、或いは吸引装置として或いは送水吸引装置として単独で使用できる。

【００５４】また、通信ケーブル９を使用しない（つまり両者を接続しない状態）で、超音波手術装置２と送水吸引装置３とを使用することにより、超音波手術装置２と送水吸引装置３とをそれぞれ単独の制御状態で使用することもできる。つまり、既存の（送水吸引機能を有しない）超音波凝固切開装置と共に（或いはこれと同じ機能となる超音波手術装置２と共に）、送水吸引装置３とを用いて、両者は連動動作は働かないが、送水及び吸引の機能を付加させて行うような処置を行うことができる。

【００５５】この場合には、両者は連動しないので、それぞれを適切にフットスイッチ等で操作しなければならないが、それぞれを独立して制御できるので、通常の連動制御とは大きく異なるような条件での処置を行うことが可能となり、使用方法、使用手技を増大できる。これに対し、図７の従来例では、図１の超音波手術装置２と送水吸引装置３を一体化して連動制御させた場合での使用方法しか出来ないので、処置条件が制約される。また、送水吸引装置単独での使用ができない等、処置が制約される。

【００５６】このように本実施の形態によれば、送水吸引装置３を超音波手術装置２に通信ケーブル９で接続することにより、両者を連動して使用する超音波手術システム１を構成できるし、それぞれを単独で使用することもでき、使い勝手の良い拡張性のある装置を実現できる。

【００５７】（第２の実施の形態）次に本発明の第２の実施の形態を図４及び図５を参照して説明する。図４は本発明の第２の実施の形態の高周波手術システムの全体構成を示し、図５は高周波手術装置（電気メス）側の処理内容を示す。

【００５８】図４に示す本発明の第２の実施の形態を備えた高周波手術システム２１は高周波電流により生体組織を切開、凝固する高周波手術装置（電気メス）２２と、この電気メス２２と通信ケーブル９を介して接続される送水吸引装置３と、電気メス２２及び送水吸引装置３と接続され、術者が把持して高周波による処置を行う高周波処置部、より具体的には組織を挟み、凝固するピンセット状のバイポーラ処置具としてのバイポーラフォーセプス２４と、例えば送水吸引装置３と接続され、高周波出力動作及び送水動作の制御操作を行うためのフットスイッチ２５とからなる。この高周波手術システム２１では電気メス２２と送水吸引装置３が別体となったものである。

【００５９】また、図４で示す電気メス２２は、図８で示す電気メス６１から送水部６５を削除した機能限定されたものに相当する。具体的には、電気メス２２は高周波を出力する高周波出力部２６と、この高周波出力部２６の動作を制御する制御部２７と、送水吸引装置３を介してフットスイッチ２５の切開ペダル２５ａ及び凝固ペダル２５ｂのスイッチ操作を検出するスイッチ検知部２８とを有する。

【００６０】上記制御部２７は、通信ケーブル９で接続される機器、ここでは送水吸引装置３と双方向の通信を行う通信部２７ａを有する。また、この通信部２７ａ内には、この電気メス２２の機器の種別が可能であると共に、固有情報を持つＩＤ情報の発生手段を備えている。また、通信ケーブル９により接続される機器からのＩＤ情報により、その機器の種別等を識別する識別手段を備えている。

【００６１】また、高周波出力部２６は、従来の高周波手術装置に相当するものであり、この高周波出力部２６には、高周波を出力するのに必要な、電源、制御部、発振部、出力部、検知部から構成されている。一方、送水吸引装置３は第１の実施の形態で説明した構成となっており、第１の実施の形態と同じ符号を付け、その説明を省略する。

【００６２】また、バイポーラフォーセプス２４は高周波駆動ケーブル３１を介して電気メス２２の高周波出力部２６と接続され、また送水チューブ３２を介して送水吸引装置３の送水部１１と接続される。

【００６３】本実施の形態も電気メス２２と送水吸引装置３は通信ケーブル９で接続され、連動制御が可能となっている。次に本実施の形態における送水吸引装置３による通信処理は図２で説明したようになる。簡単に説明すると、電気メス２２と送水吸引装置３が接続されると、互いに通信を始める。両機器は装置固有のＩＤ情報を所有しており、そのＩＤ情報により、互いに今どの機器と接続されているかを認識する。

【００６４】互いに認識できない場合は、各装置固有の動作しかせず、連動制御は働かない。ＩＤ情報は一定期間ごとに互いに送受信して、異なったＩＤ情報が返信された場合、或いは返信が帰ってこない場合は、接続異常と認識して、通信エラー処理として警告を告知し、装置の動作が停止する。

【００６５】一方、電気メス２２による通信処理は図５に示すようになる。図５に示す処理は図３の処理において、ステップＳ１２の代わりにステップＳ１２′で示す電気メス単独での制御処理に置換した内容となっており、その他は同様であるので同じ符号を付け、その説明を省略する。

【００６６】次にＩＤ情報により、電気メス２２と送水吸引装置３が互いに接続されたと認識した連動制御の場合の動作を説明する。フットスイッチ２５の切開ペダル２５ａが踏まれると、その情報が送水吸引装置３のスイッチ検知部１４に入力され、検知結果が送水吸引装置３の制御部１３に伝えられる。

【００６７】送水吸引装置３の制御部１３は、電気メス２２の制御部２７にその情報を伝える。電気メス２２の制御部２７は、電気メス２２の高周波出力部２６に伝

え、バイポーラフォーセプス２４の先端の図示しない両電極部間に両電極部で挟まれた組織を通して高周波電流が出力され、切開の処置がされる。

【００６８】フットスイッチ２５の凝固ペダル２５ｂが踏まれると、その情報が送水吸引装置３のスイッチ検知部１４に入力され、検知結果が送水吸引装置３の制御部１３に伝えられる。送水吸引装置３の制御部１３は、電気メス２２の制御部２７及び、スイッチ検知部２８にその情報を伝える。

【００６９】電気メス２２の制御部２７は、電気メス２２の高周波出力部２６にその情報を伝え、バイポーラフォーセプス２４の先端の図示しない両電極部間に両電極部で挟まれた組織を通して高周波電流が出力され、凝固の処置がされる。同時に、送水吸引装置３の制御部１３は、送水吸引装置３の送水部１１にその情報を伝え、バイポーラフォーセプス２４の先端の図示しない送水開口部より液体が射出される。

【００７０】一方、通信ケーブル９を接続しないようにすれば、電気メス２２及び送水吸引装置３それぞれを独立して使用でき、使用方法、使用手枝がを増大できる。以上のように接続される機器（装置）が電気メス２２の場合で説明したが、その他は第１の実施の形態の場合と同様の効果を有する。

【００７１】そして、第１及び第２の実施の形態から共通化できる送水吸引手段をひとつにし、かつ、接続相手を認識できるようにすることで、ユニット数を減らせ、装置を効率的に使用できる。

【００７２】又、送水吸引装置３は、超音波手術装置２、電気メス２２、どちらにも接続可能なため、経済的、スペース的にも節約できる。

【００７３】送水吸引装置３は、超音波手術装置２、電気メス２２、どちらに接続されたかを判別し、その情報に基づき送水吸引装置３の必要な機能のみが動作するため、使用者は簡単な操作で、使い勝手（操作性）の良い使用が可能となる。

【００７４】（第３の実施の形態）次に本発明の第３の実施の形態を図６を参照して説明する。上述の第１或いは第２の実施の形態の説明では、送水吸引装置３に接続される超音波手術用フットスイッチ５と電気メス用フットスイッチ２５は、コネクタ形状もしくは、信号配線が異なり、送水吸引装置３に（例えば通信ケーブル９で超音波手術装置２が接続された状態で、超音波手術用フットスイッチ５が接続される代わりに）誤って電気メス用フットスイッチ２５が接続されるような誤接続されて動作しないようになっている。これにより、意図しない誤動作（制御）を防ぐことができるようにしている。これは安全性を確保できるが、複数のコネクタ形状が異なるものを接続できるようにしたり、信号配線の数が増大する等によるコストアップなどの不便な面もある。

【００７５】本実施の形態を備えた高周波手術システム２１′は例えば図４の高周波手術システム２１において、電気メス用フットスイッチ２５に識別用ＩＤの発生手段を設けて、送水吸引装置３に接続されたときに、接続されたフットスイッチが例えば電気メス用フットスイッチ２５であること等を認識できるようにしたものである。図６では電気メス用フットスイッチ２５の場合を示したが超音波手術用フットスイッチにも同様に識別用ＩＤの発生手段を設ける。

【００７６】識別方法は、例えばフットスイッチ２５内に識別抵抗３３が付設されていて、そこに送水吸引装置３に設けた定電流源３４から定電流が流れ、その識別抵抗３３に発生した電圧レベルにより、どの機種のフットスイッチかを識別する。

【００７７】これにより、例えば、超音波手術装置２と送水吸引装置３が接続され、電気外科手術用フットスイッチ２５が接続されたときには、超音波手術装置２とフットスイッチ２５とが異なる機種のため、警告ならびにその旨をユーザに告知し、正しいフットスイッチを接続することを促す。

【００７８】又、フットスイッチの種別により、送水吸引装置３から超音波手術装置２又は、電気メス２２のスイッチ検知部８或いは２８に送信する配線を切替え、超音波手術装置２又は、電気メス２２を制御可能となる。

【００７９】又、これにより、送水吸引装置３の制御部１３と、超音波手術装置２又は、電気メス２２のスイッチ検知部８又は２８を接続するケーブルのコネクタを同じにでき、いちいち、接続する機種により、取り替える必要がない利点がある。その他は第１或いは第２の実施の形態と同様の効果を有する。

【００８０】なお、上述では送水吸引装置３に接続されるスイッチ手段としてフットスイッチの場合で説明したが、フットスイッチに限定するものではなく、他のスイッチ、例えばハンドスイッチなどのリモートスイッチでも良い。

【００８１】［付記］

１．流体を供給する供給手段と、流体等を吸引回収する回収手段とを備えた流体供給回収装置において、選択的に接続される超音波手術装置または高周波手術装置と通信する通信手段と、接続された装置の種別を識別する装置識別手段と、前記装置識別手段によって識別された装置の種別に合わせて、前記超音波手術装置または高周波手術装置との通信により前記供給手段および回収手段の少なくとも供給手段を前記超音波手術装置または高周波手術装置の動作に連動して動作させる制御手段と、を備えたことを特徴とする流体供給回収装置。

２．超音波手術装置または高周波手術装置と接続・通信する通信手段と、接続された装置の種別を識別する装置識別手段と、前記超音波手術装置または前記高周波手術装置の処置部に流体を供給する供給手段と、前記超音波手術装置または前記高周波手術装置の処置部に供給した

流体、組織等を回収する回収手段と、前記装置識別手段によって識別された装置の種別に合わせて、前記超音波手術装置または高周波手術装置との通信により前記供給手段および回収手段を前記超音波手術装置または高周波手術装置の動作に連動して動作させる制御手段と、を備えたことを特徴とする流体供給回収装置。

【００８２】３．送水吸引装置、超音波手術装置、電気外科手術装置において、各機器（装置）の固有のＩＤ情報を持つ手段と、他の機器を接続されたときに接続された機器のＩＤを識別するための識別検知手段と、識別検出手段の結果に基づき、動作制御を行う手術システム

４．付記３において、送水吸引装置と超音波手術装置が接続された場合に、超音波出力手段、送水手段、吸引手段が連動制御される手術システム。

【００８３】５．付記３において、送水吸引装置と電気外科手術装置が接続された場合に、高周波出力手段、送水手段が連動制御される手術システム。

６．超音波手術用フットスイッチ、電気外科手術用フットスイッチかを判別するためのＩＤ情報を持つフットスイッチ、接続されたフットスイッチがどの機器のものであるかをＩＤにより判別する送水吸引装置、超音波手術装置、電気外科手術装置。

【００８４】

【発明の効果】以上説明したように本発明によれば、流体を供給する供給手段と、流体等を吸引回収する回収手段とを備えた流体供給回収装置において、選択的に接続される超音波手術装置または高周波手術装置と通信する通信手段と、接続された装置の種別を識別する装置識別手段と、前記装置識別手段によって識別された装置の種別に合わせて、前記超音波手術装置または高周波手術装置との通信により前記供給手段および回収手段の少なくとも供給手段を前記超音波手術装置または高周波手術装置の動作に連動して動作させる制御手段と、を設けているので、単独での使用ができると共に、種別が異なる装置に接続して連動制御ができるようにして、経済的な使用ができ、かつ広い適用範囲を確保できる。

【図面の簡単な説明】

【図１】本発明の第１の実施の形態を備えた超音波手術システムの全体構成を示すブロック図。

【図２】送水吸引装置の処理内容を示すフローチャート図。

【図３】超音波手術装置の処理内容を示すフローチャート図。

【図４】本発明の第２の実施の形態を備えた高周波手術システムの全体構成を示すブロック図。

【図５】高周波手術装置（電気メス）の処理内容を示すフローチャート図。

【図６】本発明の第３の実施の形態を備えた高周波手術システムの全体構成を示すブロック図。

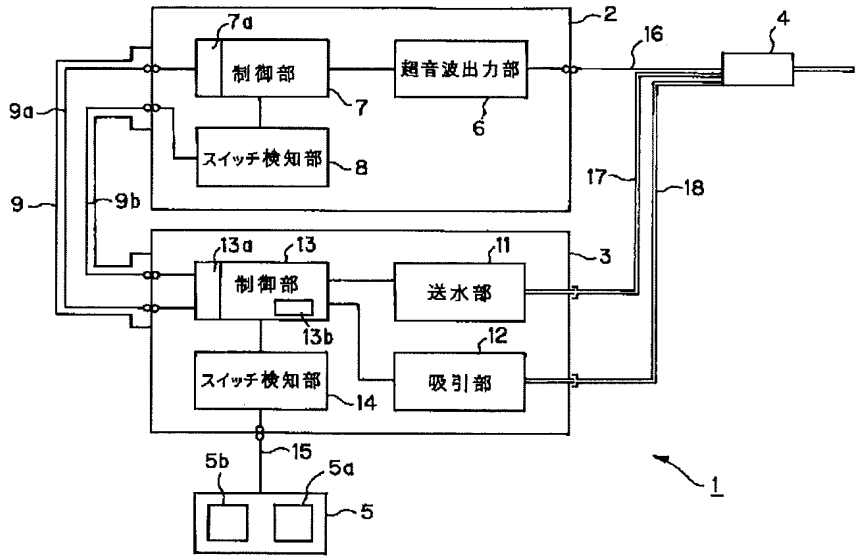
【図７】従来例の超音波手術装置の構成を示すブロック図。

【図８】従来例の高周波手術装置（電気メス）の構成を示すブロック図。

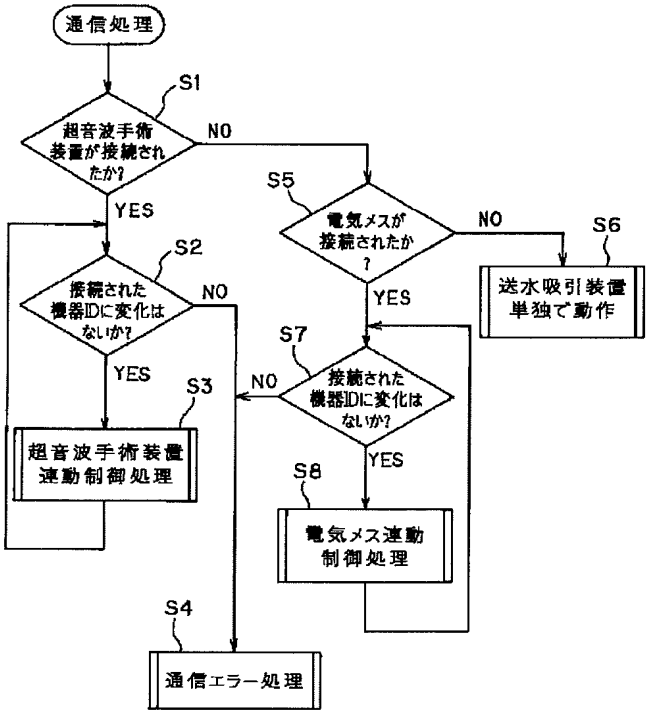
【符号の説明】

１…超音波手術システム
２…超音波手術装置
３…送水吸引装置
４…超音波プローブ
５…フットスイッチ
５ａ…超音波ペダル
５ｂ…送水ペダル
６…超音波出力部
７…制御部
７ａ…通信部
８…スイッチ検知部
９…通信ケーブル
１１…送水部
１２…吸引部
１３…制御部
１３ａ…通信部
１３ｂ…記憶部
１４…スイッチ検知部
１５…接続ケーブル
１６…超音波駆動ケーブル
１７…送水チューブ
１８…吸引チューブ
２１…高周波手術システム
２２…高周波手術装置（電気メス）
２４…バオポーラフォーセプス
２５…フットスイッチ
２６…高周波出力部
２７…制御部
２８…スイッチ検知部

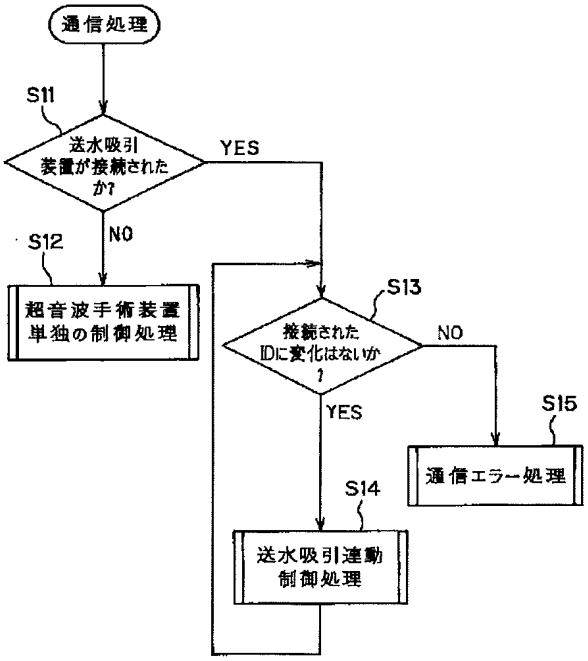
【図１】


制御部
超音波出力部
スイッチ検知部
制御部
送水部
スイッチ検知部
吸引部
2
3
4
5
5a
5b
6
7
7a
8
9
9a
9b
11
12
13
13a
13b
14
15
16
17
18
1

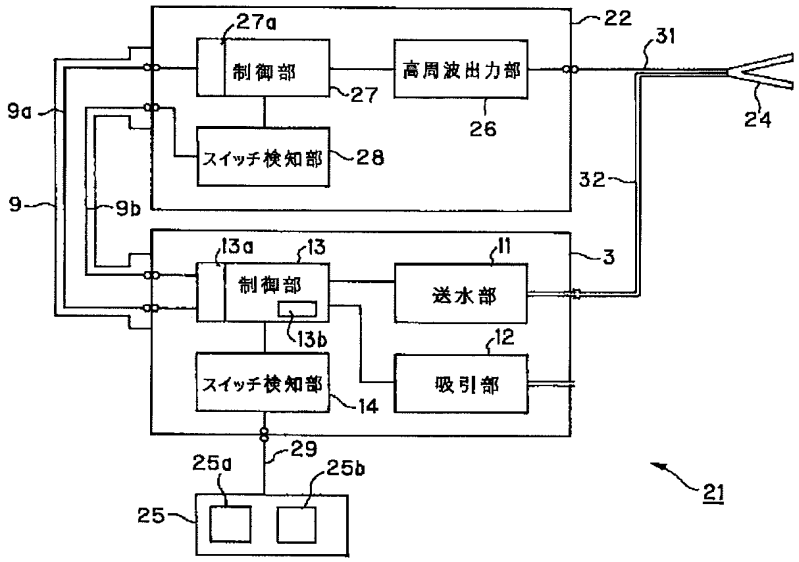
【図２】


通信処理
超音波手術装置が接続されたか?
NO
YES
接続された機器IDに変化はないか?
NO
YES
超音波手術装置連動制御処理
電気メスが接続されたか?
NO
YES
送水吸引装置単独で動作
接続された機器IDに変化はないか?
NO
YES
電気メス連動制御処理
通信エラー処理
S1
S2
S3
S4
S5
S6
S7
S8

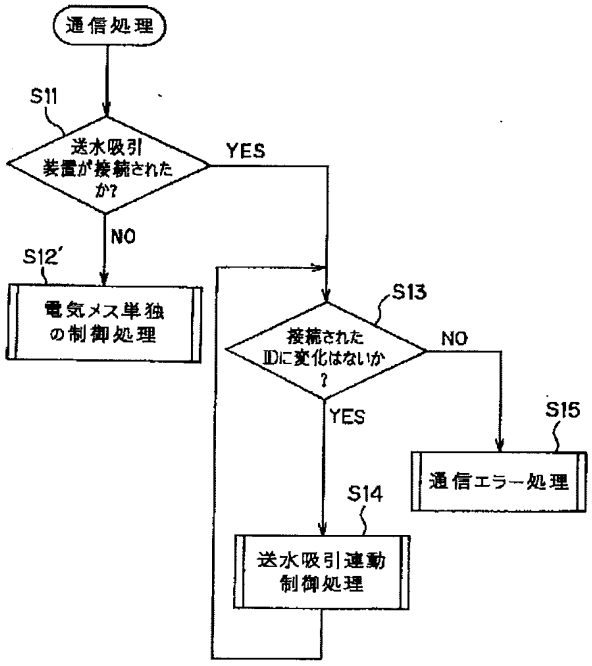
【図３】


通信処理
送水吸引装置が接続されたか?
YES
NO
超音波手術装置単独の制御処理
接続されたIDに変化はないか?
NO
YES
通信エラー処理
送水吸引連動制御処理
S11
S12
S13
S14
S15

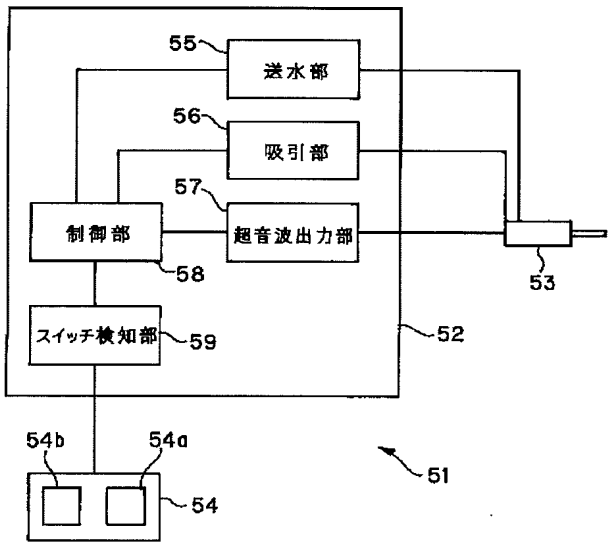
【図４】


27a
制御部
27
高周波出力部
26
22
31
24
9a
スイッチ検知部
28
32
9
9b
13a
13
制御部
13b
11
送水部
3
12
スイッチ検知部
14
吸引部
29
25a
25b
25
21

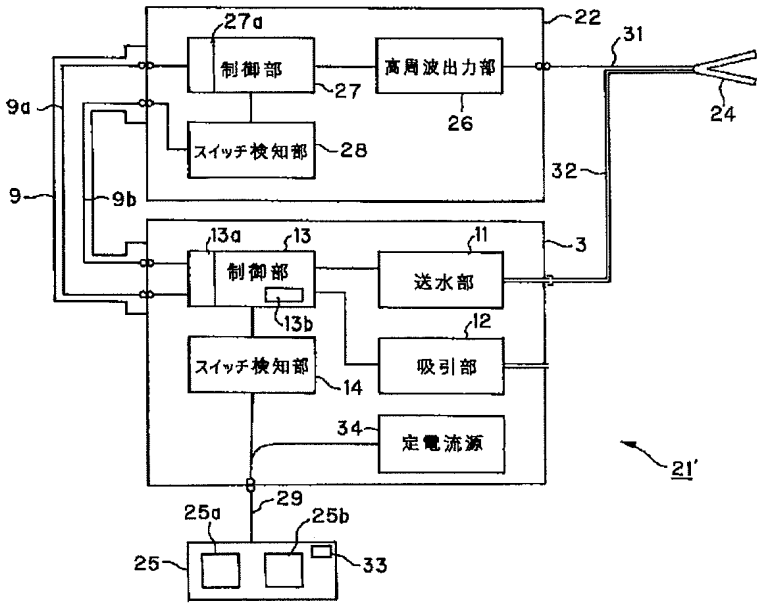
【図５】


通信処理
S11
送水吸引装置が接続されたか?
YES
NO
S12'
電気メス単独の制御処理
S13
接続されたIDに変化はないか?
NO
YES
S15
通信エラー処理
S14
送水吸引連動制御処理

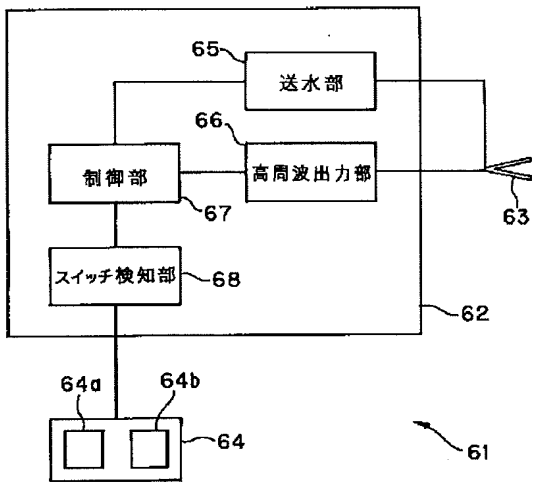
【図７】


55
送水部
56
吸引部
57
制御部
超音波出力部
58
53
スイッチ検知部
59
52
54b
54a
54
51

【図６】


27a
制御部
27
高周波出力部
26
22
31
24
9a
9
9b
スイッチ検知部
28
32
13a
13
制御部
13b
11
送水部
3
スイッチ検知部
14
12
吸引部
34
定電流源
21'
29
25a
25b
25
33

【図８】


65
送水部
66
制御部
高周波出力部
67
63
スイッチ検知部
68
62
64a
64b
64
61

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/060447

A. CLASSIFICATION OF SUBJECT MATTER
A61B18/12(2006.01)i

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)
A61B18/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013
Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2006-341066 A (Olympus Medical Systems Corp.), 21 December 2006 (21.12.2006), paragraphs [0232] to [0243]; fig. 41 & US 2006/0265035 A1	1-5,7 6
Y	JP 2006-187668 A (Olympus Corp.), 20 July 2006 (20.07.2006), paragraph [0013] (Family: none)	6
A	JP 2001-501513 A (Medtronic, Inc.), 06 February 2001 (06.02.2001), entire text & EP 1007111 A & WO 1998/014131 A1 & AU 7385796 A & CA 2266073 A	1-7

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* 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
18 April, 2013 (18.04.13)	07 May, 2013 (07.05.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/060447

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-112768 A (Olympus Optical Co., Ltd.), 24 April 2001 (24.04.2001), entire text & US 6666860 B1	1-7

国際調査報告

国際出願番号　ＰＣＴ／ＪＰ２０１３／０６０４４７

Ａ．　発明の属する分野の分類（国際特許分類（ＩＰＣ））

Int.Cl.　A61B18/12(2006.01)i

Ｂ．　調査を行った分野

調査を行った最小限資料（国際特許分類（ＩＰＣ））

Int.Cl.　A61B18/12

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報	１９２２－１９９６年
日本国公開実用新案公報	１９７１－２０１３年
日本国実用新案登録公報	１９９６－２０１３年
日本国登録実用新案公報	１９９４－２０１３年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）

Ｃ．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求項の番号
X	JP 2006-341066 A (オリンパスメディカルシステムズ株式会社)	1-5, 7
Y	2006.12.21, 段落【0232】-【0243】、図41 & US 2006/0265035 A1	6
Y	JP 2006-187668 A (オリンパス株式会社) 2006.07.20, 段落【0013】(ファミリーなし)	6
A	JP 2001-501513 A (メドトロニック・インコーポレーテッド) 2001.02.06, 全文 & EP 1007111 A & WO 1998/014131 A1 & AU 7385796 A & CA 2266073 A	1-7
A	JP 2001-112768 A (オリンパス光学工業株式会社) 2001.04.24, 全文 & US 6666860 B1	1-7

☐　Ｃ欄の続きにも文献が列挙されている。

☐　パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー

「Ａ」特に関連のある文献ではなく、一般的技術水準を示すもの

「Ｅ」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの

「Ｌ」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）

「Ｏ」口頭による開示、使用、展示等に言及する文献

「Ｐ」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献

「Ｔ」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの

「Ｘ」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの

「Ｙ」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの

「＆」同一パテントファミリー文献

国際調査を完了した日 １８．０４．２０１３	国際調査報告の発送日 ０７．０５．２０１３
国際調査機関の名称及びあて先 日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	特許庁審査官（権限のある職員）　３Ｉ　９４２４ 村上　聡 電話番号　０３－３５８１－１１０１　内線　３３４６

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Filer:	James Albert Oliff/Cynthia Kline
Attorney Docket Number:	153190

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1600**

Electronic Acknowledgement Receipt

EFS ID:	18020317
Application Number:	14163528
International Application Number:	
Confirmation Number:	1030
Title of Invention:	SURGICAL DEVICE
First Named Inventor/Applicant Name:	Hideo SANAI
Customer Number:	25944
Filer:	James Albert Oliff/Cynthia Kline
Filer Authorized By:	James Albert Oliff
Attorney Docket Number:	153190
Receipt Date:	24-JAN-2014
Filing Date:	
Time Stamp:	16:16:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1600
RAM confirmation Number	3101
Deposit Account	150461
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	153190_ADS.PDF	1503289 0abb606913ccc571752b50be16b786186bc281fd	no	6
Warnings:					
Information:					
2	Transmittal of New Application	153190_53BTrns.pdf	212841 25549a82b086bde87696e960d03829057d91b732	no	3
Warnings:					
Information:					
3		153190_App.pdf	1020211 be8e8f406ebae0ea7e0d566b9b6b5c31ccde9427	yes	21

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification - Not in English	1	14
Drawings-only black and white line drawings	15	21

Warnings:					
Information:					
4	Oath or Declaration filed	153190_Dec.pdf	200857 75a4fbe1bc651a4db43fec9f1ac2eaad699d791c	no	2
Warnings:					
Information:					
5	Miscellaneous Incoming Letter	153190_TransPOA.pdf	121125 4d3c25b91c1f6789b4f8a3a3184bcd9865510040	no	1
Warnings:					
Information:					
6	Power of Attorney	153190_GenPOA.pdf	80174 c0854b0901cc48b8b25f5be01d835ffade685f4a	no	2
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
7	Information Disclosure Statement (IDS) Form (SB08)	153190_IDS.pdf	122340 ea4bd1c16d110b6d9f9b84ebbad4de70c2254da0	no	3

Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
8	Foreign Reference	153190_Ref6.pdf	579204 4e2b1483f871b65a3eb4bc2c68b4d0ff25616105	no	16
Warnings:					
Information:					
9	Foreign Reference	153190_Ref7.pdf	5749728 a64019e0db9b6a2ed12cff9eccf7fa7f9aca2c91	no	93
Warnings:					
Information:					
10	Foreign Reference	153190_Ref8.pdf	1629740 af528a3f59213ceb2416202e6db23eb41e442159	no	31
Warnings:					
Information:					
11	Foreign Reference	153190_Ref9.pdf	916493 1e92fa27b05c97f9c8d04c281190964cc9181dac	no	19
Warnings:					
Information:					
12	Foreign Reference	153190_Ref10.pdf	1976920 c8be86d67db8e52bd590dc56f96e9e9694700045	no	23
Warnings:					
Information:					
13	Non Patent Literature	153190_Ref11isr.pdf	157866 ea9757ab1f95384a16a90e40727a670fcec2ed6b	no	3
Warnings:					
Information:					
14	Fee Worksheet (SB06)	fee-info.pdf	32839 b3ac608af1abb48dd5dc05d3a9ac2ddbd19c00a5	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	14303627	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	153190
	Application Number	
Title of Invention	SURGICAL DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hideo		SANAI	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hachioji-shi	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o OLYMPUS I.P. SERVICES CO., LTD.		
Address 2	I.P. Support Dept., 2-3 Kuboyama-cho		
City	Hachioji-shi, Tokyo	**State/Province**	
Postal Code	192-8512	**Country** i	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	25944		
Email Address	email@oliff.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURGICAL DEVICE		
Attorney Docket Number	153190	**Small Entity Status Claimed** ☐	
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	

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Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	25944		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	PCT/JP2013/060447	2013-04-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/JP2013/060447	non provisional of	61/636,269	2012-04-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

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Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Remove Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(●) Assignee ( ) Legal Representative under 35 U.S.C. 117 ( ) Joint Inventor

( ) Person to whom the inventor is obligated to assign. ( ) Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. [X]

Organization Name	OLYMPUS MEDICAL SYSTEMS CORP.		
Mailing Address Information:			
Address 1	43-2, Hatagaya 2-chome, Shibuya-ku		
Address 2			
City	Tokyo	**State/Province**	
Country [i]	JP	Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

Remove

If the Assignee is an Organization check here. [X]

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Organization Name			
Mailing Address Information:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Todd M. Guise/ for James A. Oliff			Date (YYYY-MM-DD)	2014-01-24
First Name	Todd	Last Name	Guise	Registration Number	46748

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.