			EPO; JPO; DERWENT; IBM_TDB			
L138	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
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L140	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
L141	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
L142	56	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
L143	14131	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L144	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L145	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L146	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L147	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L148	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L149	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L150	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
L151	33	L143 and L144	US-PGPUB;	OR	OFF	2012/09/14

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			12:25
L152	172	L143 and L145	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L153	217	L143 and L146	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L154	348	L143 and L147	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L155	176	L143 and L148	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L156	9	L143 and L149	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
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L159	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
L160	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
L161	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" |	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25

Solventum-Exhibit 1013-0802

		"4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
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L163	43	L99 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L164	19	L100 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L165	53	L101 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L166	73	"4108574" "4208171"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L167	0	L166 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L168	6	L166 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L169	6	"20040015042" "20050180868"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L170	63	"4552552"	US-PGPUB; USPAT; EPO; DERWENT;	OR	OFF	2012/09/14 12:25

Solventum-Exhibit 1013-0803

			IBM_TDB			
L171	33	L170 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L172	0	L170 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L173	21	"5116206" "7503910"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
L174	4	L173 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
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L177	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L81	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2012/09/14 12:25
L175	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2012/09/14 12:25
L178	0	enclosure and applying and negative and pressure and wound and attachable and circumference and confined and volume and tube and outlet and connectable and vacuum	USPAT; UPAD	OR	OFF	2012/09/14 12:30

Solventum-Exhibit 1013-0804

		and source and venting and arrangement and calibrated and orifice and restrict and flow and ambient and air.clm.				
L179	1	enclosure and applying and negative and pressure and wound and attachable and circumference and confined and volume and tube and outlet and connectable and vacuum and source and venting and arrangement and calibrated and orifice and restrict and flow and ambient and air.clm.	US-PGPUB	OR	OFF	2012/09/14 12:30

9/14/2012 12:31:39 PM
C:\Users\itreyger\Documents\EAST\Workspaces\11989297.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11989297	ADAHAN, CARMELI
	Examiner	**Art Unit**
	ILYA Y TREYGER	3761

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	10/05/2010	04/15/2011	09/26/2011	05/22/2012	09/14/2012				
	1	-	-	-	-	-				
	2	-	-	-	-	-				
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	8	-	-	-	-	-				
	9	-	-	-	-	-				
	10	-	-	-	-	-				
1	11	✓	✓	✓	✓	=				
	12	✓	✓	-	-	-				
2	13	✓	✓	✓	✓	=				
3	14	✓	✓	✓	✓	=				
	15	-	-	-	-	-				
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	33	-	-	-	-	-				
4	34		✓	✓	✓	=				
5	35		✓	✓	✓	=				
6	36		✓	✓	✓	=				

Solventum-Exhibit 1013-0806

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11989297	ADAHAN, CARMELI
	Examiner	Art Unit
	ILYA Y TREYGER	3761

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
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9	39		✓	✓	✓	=				
10	40		✓	✓	✓	=				
11	41		✓	✓	✓	=				
12	42		✓	✓	✓	=				
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14	44		✓	✓	✓	=				
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22	52		✓	✓	✓	=				
23	53		✓	✓	✓	=				
24	54				✓	=				

Solventum-Exhibit 1013-0807

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11989297	ADAHAN, CARMELI
Examiner	**Art Unit**
ILYA TREYGER	3761

ORIGINAL		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
604	540	A 6 1 M 1 / 00 (2006.01.01)	

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
604	35	305	306	307	308
604	313	317	318	319	320
604	321	322	323	541	542
604	543	544	902		

☒ 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
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10	40														
11	41														
12	42														
13	43														
14	44														
15	45														
16	46														

/ILYA TREYGER/ Examiner.Art Unit 3761 (Assistant Examiner)	09/14/2012 (Date)	**Total Claims Allowed:** 24
/TATYANA ZALUKAEVA/ Supervisory Patent Examiner.Art Unit 3761 (Primary Examiner)	09/21/2012 (Date)	O.G. Print Claim(s) 1 O.G. Print Figure 1

Solventum-Exhibit 1013-0808

To: patlaw@vorys.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 20230

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Application	Document	Mailroom Date	Attorney Docket No.
11989297	NOA	10/09/2012	067913.000085
	INTV.SUM.APP	10/09/2012	067913.000085
	NOA	10/09/2012	067913.000085

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

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

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11989297
Filing Date	2008-01-24
First Named Inventor	ADAHAN, Carmeli
Art Unit	3761
Examiner Name	TREYGER, Ilya Y.
Attorney Docket Number	067913.000085

U.S.PATENTS

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					

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U.S.PATENT APPLICATION PUBLICATIONS

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					

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FOREIGN PATENT DOCUMENTS

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	01/34223	WO	A1	2001-05-17	HEATON, Keith Patrick		☐
	2	2005/061025	WO	A1	2005-07-07	LARSSON, Michael		☐
	3	00/21586	WO	A1	2000-04-20	Hunt, Kenneth William et al.		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11989297
	Filing Date	2008-01-24
	First Named Inventor	ADAHAN, Carmeli
	Art Unit	3761
	Examiner Name	TREYGER, Ilya Y.
	Attorney Docket Number	067913.000085

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

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		☐

If you wish to add additional non-patent literature document citation information please click the Add button

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	11989297
Filing Date	2008-01-24
First Named Inventor	ADAHAN, Carmeli
Art Unit	3761
Examiner Name	TREYGER, Ilya Y.
Attorney Docket Number	067913.000085

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	/William L. Klima/	Date (YYYY-MM-DD)	2013-01-08
Name/Print	William L. Klima	Registration Number	32,422

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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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).

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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 Patent Application Fee Transmittal

Application Number:	11989297
Filing Date:	24-Jan-2008
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Filer:	William Leonard Klima/Regina Williams
Attorney Docket Number:	067913.000085

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

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($)
Miscellaneous:				
Request for continued examination	2801	1	465	465
		Total in USD ($)		**465**

Electronic Acknowledgement Receipt

EFS ID:	14645123
Application Number:	11989297
International Application Number:	
Confirmation Number:	4766
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Customer Number:	20230
Filer:	William Leonard Klima/Regina Williams
Filer Authorized By:	William Leonard Klima
Attorney Docket Number:	067913.000085
Receipt Date:	08-JAN-2013
Filing Date:	24-JAN-2008
Time Stamp:	16:33:25
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$465
RAM confirmation Number	3296
Deposit Account	220585
Authorized User	WILLIAMS, REGINA L

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

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment Submitted/Entered with Filing of CPA/RCE	11989297_Amendment.pdf	137759 8e43bbabc192f14707e942762945e56ea388204d	no	11
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	11989297_RCE.pdf	1030882 18db873cdab97b2fc1ab8f48af7597d57ca230c9	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	11989297_IDS.pdf	1350989 43ff791e012ac8a4ad6ecfb5bbed718c82a0f1e2	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Fee Worksheet (SB06)	fee-info.pdf	30518 9aac765f42e2145d80d9c25c84a6bbe22987e635	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2550148		

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<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.

Mail Stop RCE
Attorney Docket No. 067913.000085

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Carmeli ADAHAN	Conf. No.: 4766
Application No.: 11/989,297	Examiner: TREYGER, ILYA Y.
Filed: January 24, 2008	Group Art Unit: 3761

For: WOUND CLOSURE AND DRAINAGE SYSTEM

AMENDMENT

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

Dear Commissioner:

Prior to the payment of the Issue and Publication Fees, please enter the following amendments:

Amendments to the Claims begins on page 2 of this paper.

Remarks begin on page 10 of this paper.

A **Conclusion** appears at page 11 of this paper.

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1-10. (Canceled)

11. (Currently Amended) An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure [[may]] can be selectively created in said volume, ~~said tube comprising a venting arrangement comprising a calibrated orifice to restrict flow through~~ said venting arrangement located outside said enclosure and comprising a flow restrictor[[,]] such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without ~~entering~~ having to enter said enclosure.

12. (Canceled)

13. (Previously Presented) The enclosure according to claim 11, wherein said venting arrangement comprises one or more bleeding holes.

14. (Previously Presented) The enclosure according to claim of claim 11, wherein said venting arrangement is provided in the form of a porous body.

15-33. (Canceled)

34. (Currently Amended) The enclosure according to claim 11, wherein said venting arrangement acts ~~as a flow restrictor~~ to provide, under the action of the vacuum source, a restricted flow of ambient air therethrough and along said tube.

35. (Previously Presented) The enclosure according to claim 11, wherein said enclosure facilitates drainage of fluids exuded from the wound, wherein the ambient air can enter said tube via said venting arrangement and flow together with the exuded liquids under the action of the negative pressure.

36. (Previously Presented) The enclosure according to claim 11, wherein said venting arrangement provides for ambient air to enter said enclosure via said tube and for ambient pressure to be restored in said confined volume when the vacuum source is not operating.

37. (Previously Presented) The enclosure according to claim 11, wherein in operation of the enclosure, ambient air enters the tube directly via said venting arrangement

without entering said enclosure when negative pressure is being applied to the wound via said enclosure.

38. (Previously Presented) A disposable assembly for applying negative pressure to a wound, the assembly comprising an enclosure as defined in claim 11 attachable to the wound circumference so as to define a confined volume, a vacuum pump unit of the vacuum pump connected to said enclosure so that negative pressure may be created in said volume, said vacuum pump unit being configured for being detachably attached to a drive unit of the vacuum pump for operating the pump unit, and a waste container connected to said vacuum pump unit, wherein said enclosure is connected to an inlet of said vacuum pump unit via said tube and said waste container is connected to an outlet of said vacuum pump unit.

39. (Previously Presented) A disposable assembly according to claim 38, wherein said assembly further operates to drain the wound from fluids exuded therefrom, wherein the ambient air can enter said tube via said venting arrangement and flow together with the exuded liquids under the action of the negative pressure, and facilitates draining of the exuded fluids to said waste container.

40. (Previously Presented) The disposable assembly according to claim 38, wherein said venting arrangement comprises one or more bleeding holes.

41. (Previously Presented) The disposable assembly according to claim 38, wherein said venting arrangement is provided in the form of a porous body.

42. (Currently Amended) A vacuum system for applying negative pressure to a wound, the vacuum system comprising:

an enclosure and a vacuum source, the enclosure being attachable to the wound circumference so as to define a confined volume;

a tube;

a venting arrangement comprising a flow restrictor, the enclosure having an enclosure outlet connectable to said vacuum source via said tube so that negative pressure [[may]] can be created in said volume, ~~said tube comprising a venting arrangement comprising a calibrated orifice to restrict flow through~~ said venting arrangement located ~~adjacent to said enclosure outlet and~~ outside said enclosure such that ambient air can enter said tube via said venting arrangement without entering said enclosure; and

a waste container in fluid communication with said vacuum source.

43. (Previously Presented) The vacuum system of claim 42, wherein said vacuum system further operates to drain the wound from fluids exuded therefrom, wherein the ambient air can enter said tube via said venting arrangement and flow together with the exuded liquids under the action of the negative pressure, and facilitates draining of the exuded fluids to said waste container.

44. (Previously presented) The vacuum system according to claim 42, wherein said vacuum source includes a disposable pump unit detachably attachable to a non-disposable drive unit, said enclosure and said waste container being disposable so that the ambient air that enters said tube via said venting arrangement contacts only the disposable elements and said drained liquids may be disposed of together with said disposable elements.

45. (Previously Presented) The vacuum system according to claim 44, wherein said pump unit and said drive unit are adapted for attaching and detaching by simple hand manipulations.

46. (Previously Presented) The vacuum system according to claim 42, wherein said venting arrangement comprises one or more bleeding holes.

47. (Previously Presented) The vacuum system according to claim 42, wherein said venting arrangement is provided in the form of a porous body.

48. (Currently Amended) A vacuum system for applying a negative pressure to a wound, the vacuum system comprising an enclosure and a vacuum source, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube, the enclosure having an enclosure outlet connectable

to said vacuum source via said tube so that negative pressure may be created in said volume, said tube comprising a venting arrangement comprising a ~~calibrated orifice~~ flow restrictor to restrict flow through said venting arrangement located adjacent to said enclosure outlet and outside said enclosure such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without entering said enclosure, wherein said vacuum pump comprises a collection chamber upstream of a pump inlet of said vacuum source, and wherein said tube is connected to an inlet of said collection chamber.

49. (Previously Presented) The vacuum system of claim 48, wherein said vacuum system further operates to drain the wound from fluids exuded therefrom, wherein the ambient air can enter said tube via said venting arrangement and flow together with the exuded liquids under the action of the negative pressure, and facilitates draining of the exuded fluids to said waste container.

50. (Previously Presented) The vacuum system according to claim 48, wherein said vacuum source includes a disposable pump unit detachably attachable to a non-disposable drive unit, said enclosure and said collection chamber being disposable so that the ambient air that enters said tube via said venting arrangement contacts only the disposable elements and said drained liquids may be disposed of together with said disposable elements.

51. (Previously Presented) The vacuum system according to claim 50, wherein said pump unit and said drive unit are adapted for attaching and detaching by simple hand manipulations.

52. (Previously Presented) The vacuum system according to claim 48, wherein said venting arrangement comprises one or more bleeding holes.

53. (Previously Presented) The vacuum system according to claim 48, wherein said venting arrangement is provided in the form of a porous body.

54. (Previously Presented) The vacuum system according to claim 11, wherein the venting arrangement is a tube orifice.

55. (New) The enclosure according to claim 54, said orifice having a smaller opening than a cross-section of the tube.

56. (New) The vacuum system according to claim 42, wherein the venting arrangement is a tube orifice.

57. (New The enclosure according to claim 56, said orifice having a smaller opening than a cross-section of the tube.

58. (New) The vacuum system according to claim 48, wherein the venting arrangement is a tube orifice.

59. (New) The enclosure according to claim 58, said orifice having a smaller opening than a cross-section of the tube.

REMARKS

Claims 11, 13, 14, and 34-54 are pending in the application.

Claims 11, 34, 42, and 48 are amended above.

Claims 1–10, 12, and 15-33 were previously canceled without prejudice or disclaimer of the subject matter contained therein.

Claims 55--59 are newly added.

Applicant, by amending any claims herein, makes no admission as to the validity of any rejection made by the Examiner against any claim. Applicant reserves the right to reassert any of the claims canceled or the original scope of any claim amended herein, in a continuing application.

It is respectfully submitted that the above amendments to the claims introduce no new matter within the meaning of 35 U.S.C. §132. Accordingly, Applicant requests reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

CONCLUSION

In view of the foregoing, Applicants respectfully submit that the application is in condition for examination on the merits. The Examiner is invited to contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

Respectfully submitted,

VORYS, SATER, SEYMOUR AND PEASE LLP
/William L. Klima/
William L. Klima
Reg. No. 32,422
Customer No. 20230

January 8, 2013

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Washington, D.C. 20006-1152
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Email: Patlaw@vorys.com

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11/989,297	Filing Date	2008-01-24	Docket Number (if applicable)	067913.000085	Art Unit	4766
First Named Inventor	ADAHAN, Carmeli			Examiner Name	TREYGER, Ilya Y.		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 220585

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
☐ Applicant Signature

Solventum-Exhibit 1013-0829

PTO/SB/30EFS (07-09)
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Signature of Registered U.S. Patent Practitioner			
Signature	/William L. Klima/	Date (YYYY-MM-DD)	2013-01-08
Name	William L. Klima	Registration Number	32422

This collection of information is required by 37 CFR 1.114. 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 1.11 and 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, VA 22313-1450.

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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.

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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.

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.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/989,297	Filing Date 01/24/2008	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☒		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	01/08/2013	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 29	Minus	** 33	= 0	X $31 =	0	OR	X $ =	
	Independent (37 CFR 1.16(h))	* 3	Minus	***5	= 0	X $125 =	0	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	0	OR	TOTAL ADD'L FEE	

		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/LYNNELL JOHNSON/

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179704.2

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POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	11/989,297
Filing Date	2008-01-24
First Named Inventor	C. ADAHAN
Title	WOUND CLOSURE AND DRAINAGE SYSTEM
Art Unit	3761
Examiner Name	TREYGER, ILYA Y
Attorney Docket Number	ADAHAN

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

01444

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified application 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/Inventor.

OR

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on _____

SIGNATURE of Applicant or Assignee of Record

Signature	X Carmeli Adahan	Date	X MARCH 8, 13
Name	Carmeli ADAHAN	Telephone	
Title and Company			

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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, 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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Electronic Acknowledgement Receipt

EFS ID:	15220103
Application Number:	11989297
International Application Number:	
Confirmation Number:	4766
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Customer Number:	20230
Filer:	Roger Lowen Browdy/Erin Geraghty
Filer Authorized By:	Roger Lowen Browdy
Attorney Docket Number:	067913.000085
Receipt Date:	14-MAR-2013
Filing Date:	24-JAN-2008
Time Stamp:	12:14:28
Application Type:	U.S. National Stage under 35 USC 371

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	2013-03-08poa.pdf	852593 8be85f88bf4cc2ff7e676290be8f85af38ad981b	no	1

Warnings:	
Information:	

Solventum-Exhibit 1013-0834

Total Files Size (in bytes):	852593

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
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN

CONFIRMATION NO. 4766

POA ACCEPTANCE LETTER

1444
Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

OC00000005997934

Date Mailed: 03/27/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/14/2013.

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.

/ttkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Solventum-Exhibit 1013-0836

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
11/989,297	01/24/2008	Carmeli Adahan	067913.000085

CONFIRMATION NO. 4766

POWER OF ATTORNEY NOTICE

20230
VORYS, SATER, SEYMOUR & PEASE LLP
1909 K St., NW
9th Floor
WASHINGTON, DC 20006-1152

OC00000005997918

Date Mailed: 03/27/2013

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/14/2013.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/ttkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Solventum-Exhibit 1013-0837

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

1444 7590 04/10/2013

Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

EXAMINER
TREYGER, ILYA Y

ART UNIT	PAPER NUMBER
3761	

DATE MAILED: 04/10/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	4766

TITLE OF INVENTION: WOUND CLOSURE AND DRAINAGE SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$890	$300	$0	$1190	07/10/2013

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.

Solventum-Exhibit 1013-0838

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)

1444 7590 04/10/2013
Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

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.
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	4766

TITLE OF INVENTION: WOUND CLOSURE AND DRAINAGE SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$890	$300	$0	$1190	07/10/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
TREYGER, ILYA Y	3761	604-540000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Solventum-Exhibit 1013-0839

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 form 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: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information 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.

Solventum-Exhibit 1013-0840

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.
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	4766

1444 7590 04/10/2013

Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

EXAMINER	
TREYGER, ILYA Y	

ART UNIT	PAPER NUMBER
3761	

DATE MAILED: 04/10/2013

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

The Patent Term Adjustment to date is 391 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 391 day(s).

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Solventum-Exhibit 1013-0841

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.	Applicant(s)	
	11/989,297	ADAHAN, CARMELI	
	Examiner	Art Unit	
	ILYA TREYGER	3761	

-- 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 *01/08/2013*.

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 *11,13,14 and 34-59*.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   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. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ 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).

7. ☐ 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. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 01/08/2013
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *04/03/2013* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Ilya Y Treyger/ Examiner, Art Unit 3761	/Michele M Kidwell/ Primary Examiner, Art Unit 3761

Solventum-Exhibit 1013-0843

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	11/989,297	ADAHAN, CARMELI	
	Examiner	Art Unit	
	ILYA TREYGER	3761	

All participants (applicant, applicant's representative, PTO personnel):

(1) *ILYA TREYGER*. (3)_____.

(2) *Roger Browdy*. (4)_____.

Date of Interview: *03 April 2013*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *11 and 42*.

Identification of prior art discussed: _____.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant authorized the Examiner to include words "to restrict flow through said venting arrangement" after words "flow restrictor" in claims 11 and 42 .

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Ilya Y Treyger/ Examiner, Art Unit 3761	

Solventum-Exhibit 1013-0844

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. 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 allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). 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, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 01/08/2013 has been entered.

2. Claims 11, 34, 42 and 48 are amended.

3. Claims 55-59 are new.

4. Claims 11, 13, 14 and 34-59 are examined on the merits.

Examiner's Comment

5. IDS submitted 10/31/2012 has been fully considered. Presented references alone or in combination do not constitute potential 102 or 103 rejections.

Examiner's Amendment

6. 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.

7. Authorization for this examiner's amendment was given in a telephone interview with Mr. Browdy on 04/03/2013.

8. The application has been amended as follows:

9. Claim 11 is rewritten as follows:

10. Claim 11. ------- An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement located outside said enclosure and comprising a flow restrictor such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.------

11. Claim 42 is rewritten as follows:

12. Claim 42. -------A vacuum system for applying negative pressure to a wound, the vacuum system comprising.; an enclosure and a vacuum source, the enclosure being attachable to the wound circumference so as to define a confined volume;

a tube;

a venting arrangement comprising a flow restrictor to restrict flow through said venting arrangement, the enclosure having an enclosure outlet connectable to said vacuum source via said tube so that negative pressure can be created in said volume, said venting arrangement located outside said enclosure such that ambient air can enter said tube via said venting arrangement without entering said enclosure; and

a waste container in fluid communication with said vacuum source. -------

ALLOWABLE CLAIMS

13. Claims 11, 13, 14 and 34-59 are allowed over the prior art of record.

REASONS FOR ALLOWANCE

14. The following is an examiner's statement of reasons for allowance: The closest Prior Art of record US 200110029956 and US 3,516,160 fail to teach, suggest or render obvious a flow restrictor restricting flow through the venting arrangement located outside of the enclosure that prevents the overvacuum conditions during the medical procedure.

15. Newly discovered WO 2008/039223 and WO 2008/039314 disclose the flow restrictors used in different situations that would render obvious claimed limitation, but the mentioned references are not applicable by the failing date.

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 ILYA TREYGER whose telephone number is (571)270-3217. The examiner can normally be reached on 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tatyana Zalukaeva can be reached on 571-272-1115. 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.

/Ilya Y Treyger/
Examiner, Art Unit 3761

/Michele M Kidwell/
Primary Examiner, Art Unit 3761

Notice of References Cited	Application/Control No. 11/989,297	Applicant(s)/Patent Under Reexamination ADAHAN, CARMELI	
	Examiner ILYA TREYGER	Art Unit 3761	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	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	WO 2008/039314 A2	09-2006	US	Karpowicz et al.	
	O	WO 2008/039223 A1	01-2007	US	Karpowicz et al.	
	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.

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

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11989297
Filing Date	2008-01-24
First Named Inventor	ADAHAN, Carmeli
Art Unit	3761
Examiner Name	TREYGER, Ilya Y.
Attorney Docket Number	067913.000085

U.S.PATENTS

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
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U.S.PATENT APPLICATION PUBLICATIONS

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
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FOREIGN PATENT DOCUMENTS

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	01/34223	WO	A1	2001-05-17	HEATON, Keith Patrick		☐
	2	2005/061025	WO	A1	2005-07-07	LARSSON, Michael		☐
	3	00/21586	WO	A1	2000-04-20	Hunt, Kenneth William et al.		☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /I.T./

Solventum Exhibit 1013-0851

Receipt date: 01/08/2013	Application Number	11989297 11989297 - GAU: 3761
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2008-01-24
	First Named Inventor	ADAHAN, Carmeli
	Art Unit	3761
	Examiner Name	TREYGER, Ilya Y.
	Attorney Docket Number	067913.000085

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NON-PATENT LITERATURE DOCUMENTS

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		☐

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EXAMINER SIGNATURE

Examiner Signature	/Ilya Treyger/	Date Considered	04/03/2013

*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. /I.T./

Solventum Exhibit 1013-0852

Receipt date: 01/08/2013	Application Number	11989297 11989297 - GAU: 3761
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2008-01-24
	First Named Inventor	ADAHAN, Carmeli
	Art Unit	3761
	Examiner Name	TREYGER, Ilya Y.
	Attorney Docket Number	067913.000085

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	/William L. Klima/	Date (YYYY-MM-DD)	2013-01-08
Name/Print	William L. Klima	Registration Number	32,422

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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Solventum Exhibit 1013-0853

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:

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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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /I.T./
Solvent um Exhibit 1013-0854

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60/847,221 26 September 2006 (26.09.2006) US

(71) Applicant *(for all designated States except US)*: **BOEHRINGER LABORATORIES INC.** [US/US]; 500 E. Washington Street, P.o. Box 870, Norristown, PA 19404 (US).

(72) Inventors; and

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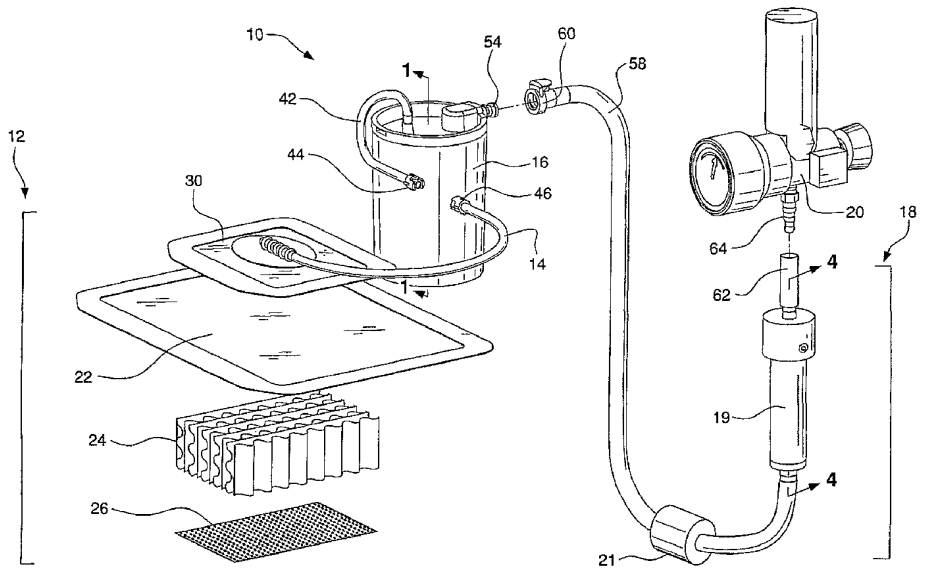
(74) Agents: **MARSHALL, John, J.** et al.; Drinker Biddle & Reath Llp, One Logan Square, 18th and Cherry Streets, Philadelphia, PA 19103-6996 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *with amended claims*

(54) **Title:** PUMP SYSTEM FOR NEGATIVE PRESSURE WOUND THERAPY



(57) **Abstract:** A portable suction pump for producing negative pressure in a system for applying suction to a wound, in which the pump has a pressure control circuit for controlling the operation of the pump to maintain the pressure between upper and lower limits around a pre-selected pressure, and a fault detection system to detect deviations in the level of negative pressure applied to the wound; wherein the fault detection system can operate independent of the pressure control circuit. In a preferred embodiment, the fault detection system uses deviation from a reference airflow to detect system faults.

WO 2008/039223 A1

Solventum-Exhibit 1013-0855

PUMP SYSTEM FOR NEGATIVE PRESSURE WOUND THERAPY

Reference to Related Application

[0001] This application claims priority of U.S. Provisional Patent Application No. 60/847,221, filed September 26, 2006.

Field of the Invention

[0002] The invention is related to the general field of wound treatment, and to the more specific field of devices for wound drainage and treatment with suction.

Background of the Invention

[0003] It is well known to treat wounds by applying suction under airtight wound covers. The suction can be used to aspirate wound exudate and other liquids from the wound and/or the wound packing materials, and the suction can be applied as a healing modality for its well known antiseptic and tissue regeneration effects.

[0004] A primary concern in using suction assisted wound therapy is maintaining consistent suction pressure at the wound. It is increasingly recognized that once suction wound dressings are applied, the suction should be maintained at certain levels. Loss of suction to the wound can result if leaks or blockages occur in the system.

[0005] Leaks can occur through breach of the airtight seals surrounding the wound. The earliest devices merely ran a tube under the edge of a wound cover and applied an adhesive or paste around the tube and cover to maintain an airtight seal. The other end of the tube was connectable to a waste collection reservoir and suction regulator of a hospital suction system, and the pressure selected at the regulator was assumed to be the approximate pressure communicated to the wound area under the cover. The test for leakage was visual observance of the cover contracting and the absence of whistling noise when negative pressure was applied. See, e.g., M. E. Chariker, et al, "Effective Management of Incisional and Cutaneous Fistulae with Closed Suction Wound Drainage", *Contemporary Surgery,* vol. 34, June 1989, pages 59-63. This initial check for an airtight seal did not, however, provide any warning if the system developed a leak or if blockage occurred in the collection circuit after hours of use.

[0006] The adhesive seal around the suction tube or other tubes which run under the edge of the wound cover in these prior wound dressings is vulnerable to cracking and breaching the airtight seal, creating air leakage into the cover. Improvements have been made to suction wound therapy devices to reduce the likelihood of leakage. For example, U.S. Application No. 11/181,128, filed July 14, 2005 and commonly assigned with this application, discloses a tube attachment patch to allow the suction tube to be terminated outside of the primary cover and thus reduce the risk of breaking the adhesive seal to the skin. While these newer tube attachment devices provide more seal integrity, there is still the potential for breach of the airtight seals, due to patient movement in bed for example.

[0007] Blockage of suction to the wound can occur for several reasons. A waste collector for wound exudate is usually positioned somewhere in the suction line between the wound and the suction source. Waste collectors incorporate shut-off mechanisms that will shut off suction to the wound when the collector is overfilled. Another potential blockage is kinking or crimping of the suction line itself. Blockage due to debris from the wound and clotting is also a concern. The suction source may also be inadvertently turned off, a line may be inadvertently clamped, or the suction regulator may be misadjusted after the dressing is applied. Since suction wound dressings are intended to last for long periods without changing, usually 24 hours or greater, a leak or blockage could develop unnoticed and not be detected for a duration sufficient to negate the beneficial healing effect of suction as well as increase the risk of infection. There are currently devices to sense when a waste collector canister is filled and provide a warning signal to empty it. None of the devices, however, provides a comprehensive and reliable monitoring of system operation, nor cover the full range of fault possibilities with leakage or blockage.

[0008] In their efforts to improve over these prior art devices, the present inventors designed a suction wound dressing monitoring system as described in U.S. Patent Application Serial No. 11/268,212. In so doing, they considered the impracticality of locating expensive pressure transducers in any of the system components that should be single-use disposable items due to contamination by body fluids. The designers considered that the same basic system should preferably be effective in detecting and

indicating both leaks and system blockage, and that the detection of leaks or blockage should preferably be effective regardless of where the leak or blockage occurs in the system. They considered that the system should preferably provide clear visual indication of both normal and abnormal operation, and could usefully provide aural indication and auto-recording of abnormalities. They also considered that the suction monitoring capability should be easily convertible from use with a stationary suction system, as typically found in hospital care rooms, to use with a portable suction pump.

Summary of the Invention

[0009] In the present invention, the inventors further considered that when using a portable pump as the suction source it would be advantageous to use a microprocessor in the pump's flow monitoring system to detect deviation from the reference airflow and provide corresponding indicators and/or alarms. The use of a microprocessor would also enable other useful functions, such as recording and accumulating various parameters in time units and providing reports of such time records.

[0010] For safety and redundancy, however, the inventors considered that it would be advantageous to provide the pump with pressure control circuitry that is independent of the microprocessor controlled airflow monitoring. This would allow the pump to control pressure to an operator selected pressure set-point without needing to rely on signals from the microprocessor. However, the pressure control circuitry could provide to the microprocessor data related to pump operation, such as the detection of an open circuit, a faulty pressure transducer or a run away pump condition. Moreover, the microprocessor could be used to reset the selected pressure for the pump control circuitry, such as for intermittent operation or to create a line clearing pressure pulse if the airflow deviation was beginning to indicate a conduit occlusion.

[0011] The inventors also considered that it would be useful for the airflow monitoring system to be coupled to a display system on the pump for convenient indication of status conditions related to air flow, such as: normal operation, low level leak, high level leak, line occlusion and a filled waste collection canister. They also considered that it would be useful for the pump to have a separate error indicating display for convenient indication of error conditions that are not related to air flow;

such as overpressure detection by the pressure transducer, pressure transducer failure, waste collection canister not attached, low battery voltage, attachment of incorrect power supply, and low operating time remaining.

[0012] Although the waste collection canister could be located anywhere between the wound dressing and the vacuum source, the inventors considered that when using a portable pump vacuum source, it would be advantageous for the pump to provide a docking station for a waste collection canister, such that the canister can be securely attached to the pump housing. In that configuration, the pump may also include a level detector for detecting and indicating the fill status of the canister. For example, the pump may have a level sensor, such as a capacitance sensor, to detect a filled waste collection canister based upon indications other than pressure differential across a hydrophobic membrane in the canister. If so, the level detector signal may be moderated by an algorithm in the microprocessor to reduce the likelihood of false indications of a full canister caused by splashing when the pump/canister is moved.

[0013] Thus, the invention provides a system for applying suction to a wound in which a reference airflow rate is used for monitoring system operation. The basic components of a wound treatment system using suction include an airtight wound dressing, a suction conduit having one end operatively associated with the wound dressing to communicate suction to the wound, and an opposite end operatively connected with a source of suction, The invention provides a reference airflow rate (or "controlled leak") to the suction source when the system is in operation, such that deviation from the reference airflow can be monitored as an indication of a change in operation. In a preferred embodiment of the invention, a portable pump is used as the suction source. The pump has a flow rate monitoring system to monitor airflow through the conduit from a wound dressing to the pump as indicative of the level of negative pressure applied to the wound. Deviation from the reference flow rate can be used as an indication of abnormal condition such as leakage of the wound dressing or occlusion in the conduit. The flow rate monitoring system is controlled by a microprocessor, which also provides additional functions of providing status and error displays and time keeping and reporting. To compensate for variations in the set point

pressure selected at the pump, the microprocessor can have a look up table for flow rates that compensate for different selected negative pressures.

[0014] For safety and redundancy, the pump has pressure control circuitry that uses solid state electronics and a pressure transducer that can operate independently of the microprocessor and flow monitoring. A user operable pressure selector enables a user to select a negative pressure pump output within a range of negative pressure set-points; and the pressure transducer and a pressure control circuit control the operation of the pump to maintain the pressure sensed by the transducer between upper and lower limits around the selected pressure.

[0015] The microprocessor provides signals to an annunciator, preferably a bar meter that is color coded and graduated to provide a visual indication of air flow through the pump. The annunciator indicates when the airflow through the pump is within a range of the reference air flow that is associated with normal system operation and conversely indicates when a deviation from the reference airflow is associated with an abnormal operation.

[0016] The pump also includes an error indicator display for displaying a visual warning of system errors that are not associated with deviation of airflow through the pump from reference airflow, such as overpressure detection by the pressure transducer, pressure transducer failure, waste collection canister not attached, low battery voltage, attachment of incorrect power supply, and low operating time remaining. The error indicator is preferably controlled by the microprocessor.

[0017] Although the pressure control circuitry generally operates independently of the microprocessor to maintain a selected pressure, the microprocessor can be used to take over supervision of the pump in certain conditions. For example, the microprocessor can re-set the selected set point, such as between a higher and lower pressure level when intermittent pressure therapy is desired. In another example, the microprocessor can be programmed to directly turn on the pump or increase the pump speed when the deviation from reference air flow begins to indicate an occlusion to cause a pressure pulse output from the pump to clear the line between the patient and the collection canister.

[0018] The microprocessor also includes timing programming to record and accumulate the time units based upon inputs from other sensors, and a time reporting routine for providing reports of the time units that the pump is running. The reports may include a record of run-time intervals, a record of the date and duration of run-time intervals, a record of total accumulated run-time, a record of accumulated compliant run time, and a record of run time remaining on a pre-set run time period.

[0019] The system includes a waste collector, disposed in the suction line between the wound dressing and the source of suction, for collecting fluids aspirated from the wound. The preferred collector is an upright transparent plastic canister with fill level markings on the outside surface. The collection canister may also have a residual suction capacity to draw fluid through the line when the pump is shut down.

[0020] The canister may be prevented from overfilling by a hydrophobic membrane filter at the top of the canister that shuts off the airflow when the canister is full. The liquids aspirated from the wound may be turned into a gel, for ease of disposal and to prevent spilling, by a gelling agent in the disposable canister. To keep the waste in the canister level, the gelling agent is preferably provided in stacked disks. The canister has an inlet connector for the suction tube from the wound dressing, and an outlet connector for connecting to a portable pump or to a flow monitoring instrument for use with stationary or hospital wall suction. The outlet connector is preferably a proprietary (non-standard) connector that will not connect directly to the standard appliance fitting of a stationary suction system, to prevent anyone from mistakenly connecting directly to the suction system.

[0021] The pump may also provide a docking station for the waste collector, such that the collector can be securely attached to the pump housing. Preferably the waste collector is a transparent plastic canister having right circular cylinder profile and fill-level markings in a band extending along the height of the cylinder, and having a connection fitting with an O-ring seal. The pump has a docking station with a concave profile conforming to a half section of the canister to support the canister, and a releasable latch fitting adapted to receive the connection fitting of the canister.

[0022] The pump may have a sensor proximate to the canister docking station for detecting when the level of waste in the canister exceeds a level which indicates a filled canister condition. A preferred sensor is a capacitance detector. The sensor sends a signal representing a level of waste collected in the canister to the microprocessor, which includes an algorithm to be applied to the signal to reduce the likelihood of an erroneous indication of a full canister caused by liquid sloshing inside the canister.

[0023] The pump may also have an activated charcoal air filter disposed between the releasable latch fitting and the pump's air discharge port for reducing odors from the pump. The pump may also have a desiccant with the filter. The pump may also utilize a controlled backpressure to lessen the noise inherent in the operation of the valves in a positive displacement pump, such as a leaf spring sound damper disposed over the pump outlet.

[0024] In a preferred embodiment, a calibrated vent in the suction conduit near the wound dressing establishes the reference airflow. Preferably the vent is located in the tube just outside of the wound cover. The vent may be an aperture in the tube sealed with a porous material having specific flow rate characteristics. The reference flow rate may be in a preferred range of 50-300 cc per minute. Higher flows such as 1000 cc/min are possible, but practical limitations on the capacity of the suction source as well as the magnitude of a leak in the dressing suggest that is preferable to use a flow below 1000 cc per minute.

[0025] By locating the vent in the conduit close to the wound, the reference airflow also serves to purge the conduit of fluids. The purging effect minimizes the likelihood of reflux of contaminated fluid back into the wound, and the risk of infection attendant to such reflux. Since the fluid does not reside in the conduit for an extended time, the purge effect also reduces the likelihood of blood clotting in the line. The pump system may also provide a pressure pulse generator to clear the collection line of serial slugs of fluid if a reduction in flow is detected.

[0026] The pump is preferably a portable battery-powered positive displacement pump in which flow rate is proportional to motor rpm allowing the airflow rate of the system to be indicated indirectly by the motor speed or pump speed. An algorithm may

be used to correct motor and pump speed to flow for compressibility effect. Thus a motor speed indicator or tachometer may be the preferred monitoring instrument. However, other flow rate monitoring instruments could be used, such as, but not limited to, target meters, rotometers, turbine meters, mass flow meters, differential pressure (Dp) cells and hot wire anemometers.

[0027] Although the term "airflow" is used herein for consistency, it should be apparent that it is not limited to the composition of ambient air. It is common in medical settings to alter the composition of airflow to a wound, such as by increased oxygen or therapeutic aerosols or other beneficial medications. The flow of any of these mixed gases or aerosol suspensions should be considered airflow for purpose of this description.

[0028] These and other advantages and aspects of the invention will become apparent upon reading the detailed description and drawings that follow.

Brief Description of the Drawings

[0029] Figure 1 is an exploded perspective view of a system for suction wound therapy.

[0030] Figure 2 is a view of a suction tube attachment device showing an air vent in the suction tube to create a controlled reference airflow rate to the suction source.

[0031] Fig 3 is a cross-section view of the waste collection canister showing the shut off membrane and gel agents.

[0032] Figure 4 is a cross section view of the wound monitor airflow indicator.

[0033] Figure 5A is an exploded perspective view of a preferred embodiment of a system for suction wound therapy using a portable suction pump.

[0034] Figure 5B is a perspective view from the top front of a portable pump which may be used in the system of Figure 5A.

[0035] Figure 6A is a schematic diagram of positive displacement pump embodiment measuring motor speed as a surrogate of airflow.

[0036] Figure 6B is a schematic diagram of a positive displacement pump embodiment using a microprocessor for flow monitoring and reporting, and for other timing, control and status display functions.

[0037] Figure 7 is a schematic view of a target meter flow indicator alternative.

[0038] Figure 8 is an exploded perspective view of a portion of an alternative embodiment of a system for suction wound therapy according to the invention using a therapeutic fluid delivery to the wound.

Detailed Description of the Invention

[0039] Figure 1 shows an embodiment of a system (10) for suction wound therapy as described in commonly owned U.S. Patent Application Serial No. 11/268,212. The components include a wound dressing subsystem (12), a suction tube (14), a waste collection canister (16), a flow monitor instrument (18) and a wall suction regulator (20) of a stationary suction source.

The Wound Dressing

[0040] The typical wound dressing (12) includes a wound cover (22) and wound packing material (24), and may include a special wound contact layer (26). It will have a suction tube (14) running under the edge of the primary cover or through the cover, or will terminate outside of the cover and communicate with a nozzle or slot in the cover. There is a wide variety of each of these components. The wound dressing (12) shown in the drawings and described herein uses presently preferred components, but the invention is not intended to be limited to these components.

[0041] The primary wound cover (22) is preferably an airtight wound cover that is vapor permeable. It is preferred to use a thin film transparent commercial bandage, such as medical grade Tegaderm™ manufactured by 3M, that is impermeable to liquids but permeable to water vapor and oxygen. The term "airtight" means that the material is sufficiently occlusive to resist airflow through the cover to maintain suction under the cover while suction is being applied. There are many other thin-film commercial bandages that have similar properties. Highly impermeable materials could also be used. However, since it is beneficial in wound therapy to allow water vapor to escape

and oxygen to migrate into the wound, semi-permeable covers of film material such as Tegaderm™ are preferred. In some instances, the primary cover could also be a rigid or semi-rigid enclosure placed over the wound. The primary wound cover is generally sealed to the skin surrounding the wound with an adhesive (not shown) incorporated in the cover, and gap filler paste (not shown) may be used where needed.

[0042] Before the primary cover (22) is applied, the wound is generally packed with a wound packing (24). Simple gauze or foam pads can be used, or other materials commercially sold as wound packings. The presently preferred wound packing, however, is polyester fibers or comparable resilient fibers in a corrugated layer pattern configured to form a resilient compressible structure, as described in U.S. Patent Application No. 10/981,119, commonly assigned with this application.

[0043] The wound packing (24) may also be attached to a wound contact layer (26). The presently preferred wound contact layer (26) has a special construction that provides a wound contact surface, with depressions formed into the surface, to work in conjunction with the suction to encourage more rapid tissue regeneration, as described in U.S. Application No. 10/982,346, commonly assigned with this application. The contact surface is configured such that voids formed by the depressions remain above the wound surface in the presence of moisture, compressive forces and suction, encouraging local tissue deflection.

[0044] The wound dressing includes a suction tube (14) attached to the wound cover. The dressing may have other tubes (28, in Figure 2) for medication supply or wound flushing. The tube(s) may pass under the edge of the cover or through it, but a presently preferred arrangement uses a tube attachment patch (30) to allow the suction tube to be terminated outside of the primary cover and reduce the risk of breaking the adhesive seal to the skin, as described in U.S. Application No. 11/181,128, commonly assigned with this application.

[0045] As shown in Figure 2, the distal end of the suction tube (14) in this embodiment has a vent hole (32) that is sealed with a porous plug (34) that provides a controlled leak, or reference airflow, for the airflow monitoring devices described hereafter. It is preferable to locate the vent (32, 34) as close to the wound cover as

possible. Having the tube attachment outside of the primary cover allows the use of this controlled leak reference airflow without drying out of the wound, as might occur if the vent were under the cover near the wound. While it is feasible to place the controlled leak in the actual wound space, consideration would need to be given to avoid excessive drying of the wound tissue due to the introduced airflow. In addition, it is possible with the type of tube attachment patch (30) shown in Figure 2 and described in U.S. Application No. 11/181,128 to provide the vent as an aperture in the patch (30).

[0046] The reference airflow rate from the calibrated vent is used for monitoring system operation. The controlled leak rate should be low to maintain a proper suction at the wound site and a moist healing environment. Preferably the reference airflow is in the range of 50-300 cubic centimeters per minute. This flow is low enough to minimize drying and does not significantly alter the suction applied at the wound. Additionally, the flow is low enough to minimize the use of battery power where a portable pump is used as the suction source. A flow of this magnitude is readily obtained by providing a vent hole (32) in the suction tube that is sealed sterile with a porous plug (34), as described above. A suitable seal material is a porous plastic manufactured by Porex from sintered high density polyethylene. Such porous materials are routinely employed to admit air into medical fluid lines at a suitable flow while maintaining an efficient sterile filtration barrier against microbes.

[0047] The wound therapist applies the wound dressing (12) to the patient and attaches the system to suction. The therapist remedies leaks in the dressing by smoothing out creases or wrinkles in the wound cover and addressing gaps due to folds in the patient's anatomy. It has at times been useful to address specific areas of difficult anatomy by using a gap filling paste, as is common in ostomy care, such as coloplast. The airflow monitoring instruments described hereafter facilitate the initial dressing set up process by providing active feedback to the therapist on the integrity of the seal around the wound cover and tubes.

The Waste Collector

[0048] Since a primary function of suction therapy is to drain liquids from the wound, the system normally includes a waste collector (16) for collecting fluids aspirated from the wound. As in the embodiment shown in Figure 3, the collector (16) may be an upright plastic canister (36) with a right circular cylinder profile that may have fill level markings in a band extending along the height of the cylinder on the outside of the canister. The markings may be on a paper label adhesively glued to the canister. The canister is preferably a disposable, single-use device. The canister has a lid (38) incorporating a fitting (40) passing through the lid for the attachment of an inlet tube (42). The inlet tube (42) may be an end of the suction tube (14) leading from the wound, or be a short section of tube that terminates with a connector fitting (44) for mating with a matching connector (46) on the end of the suction tube (14).

[0049] Airflow and any blood or other fluid aspirated from the wound passes through the fitting (40) in the lid and into the canister (36). The liquid is retained in the canister, while the air rises and is drawn through a hydrophobic membrane (50) sealed to the inside of the lid. The membrane (50) acts as a bacteria filter, and can be used as a shut off mechanism to prevent the canister from overflowing and to prevent contamination from flowing out of the container toward the suction source.

[0050] The lid defines an air channel from the outlet port (52) to another connector (54) for connecting the canister to a portable pump or to a tube running to a stationary wall suction system. The second connector (54), however, is preferably a proprietary (non-standard) connector that will not connect directly to the standard appliance fitting of a stationary suction system. This is to prevent anyone from mistakenly connecting directly to the suction system without the flow monitoring instrument and pressure release features described hereafter, with the attendant risk of applying too great a suction to the wound. The mating receptacle in the portable pump configuration described hereafter is configured to receive the proprietary connector. The connector (54) includes a sealing element such as an O-ring seal. This arrangement provides that a fresh O-ring is preferably used with each disposable canister, as contrasted with other pump connectors where the sealing element is in the pump and will ultimately wear out and cause the system to fail because of leakage.

[0051] The air passage through the canister thus forms a part of a suction conduit between the wound and the suction source. In one embodiment of the system described herein, the canister (36) is prevented from overfilling by the hydrophobic membrane (50). If the canister (36) is allowed to fill high enough for the contents to contact the membrane, the membrane occludes and blocks airflow from passing through the canister. This blockage prevents suctioning more waste from the wound, and as described hereafter, the blockage of reference airflow is detected as an indication of an abnormal operating condition. In other embodiments described hereafter, the level of waste product in the canister can be detected by a capacitance sensor or other detector on the pump, and the detection used to prevent overfill.

[0052] Preferably the liquid waste sucked from the wound is turned into a gel for ease of disposal and to prevent spilling or splashing. Although the gelling agent could be provided in porous bags, it is preferred to use disks (56) of laminated fiber sheets containing a gelling agent, such as provided by Gelok International. The disks (56) are cut to fit inside of the jar and stacked on top of each other. The stacked disks cause the liquid to turn to a level surface gel in the canister.

[0053] The system may also include a filter/drier unit (21) disposed between the waste collection canister and the wound flow monitor (18). The filter element provides additional protection against contaminated particles entering the suction source, and the drier removes moisture from the air that may effect the calibration of the flow monitoring instrument.

Use of Controlled Reference Airflow to Indicate Normal Operation

[0054] While prior art suction dressing systems either do not monitor system operation at all, or do so less than optimally by trying to sense pressures directly, the system described herein uses a reference airflow, as may be provided by the air vent (32) described above, to indicate when the system is in normal operation, and also to detect deviation from the reference airflow as an indication of abnormal operation. Higher airflow than the reference flow indicates leakage, while lower airflow indicates blockage.

[0055] The range of flows suitable for reference flow are bound by the permeability of the wound cover on the lower end and suction limits on the upper end. When the wound cover is a semi permeable material, there will be a natural low level background airflow from air molecules passing through the cover. This permeation airflow could serve as the reference flow if the flow monitoring instrument were very sensitive. However, the permeation flow is usually too low and too erratic to be a good reference. The area of the cover and the possibility of it being obstructed by surgical drapes and fluid from the wound can cause the permeation flow to be erratic. Thus, the vent provides a larger and more stable flow rate that masks variation in the permeation flow and provides a good reference. For example, Tegaderm® bandage will allow a diffusion of water on the order of 800 grams/square meter/day, which correlates to a flow rate of about 0.5 cc/min over a square meter. Typical wound cover area would be less than a tenth of a square meter, so in approximate terms, the semi permeable material contributes 0.05 cc/min, or less than .1% of a reference flow of 50 cc/min. Thus, any variation in the background permeation flow is masked by the larger reference flow.

[0056] The indicator sub-system may be embodied in two devices as depicted and described below; a wound monitor flow instrument for use with a stationary suction source and a portable pump with a flow sensing system. Other types of flow indicating devices, such as target meters or hot wire anemometers could also be used.

The Flow Monitor

[0057] In the wound suction system of Figure 1, the flow rate monitor is a float meter (19) that includes a suction conduit (58) between the waste collection canister (16) and a stationary suction source. One end of the conduit includes a mating connector (60) to the proprietary connector (54) of the canister. The flow monitor (18) is preferably located at the other end of the conduit (58) and attaches directly to an appliance connection fitting (64) associated with an adjustable suction regulator (20) as commonly found on stationary suction systems.

[0058] The flow monitor (18) is designed to provide a visual indication of the flow rate through the system. Once the flow rate stabilizes at the controlled reference airflow following initial application, the maintenance of this visual indication of

reference flow is an indication of normal operation free of leaks or blockage, and hence an acceptable level of suction at the wound cover. Deviation to a higher airflow indicates leakage, and drop to lower or no airflow indicates blockage in the collection circuit.

[0059] Figure 4 is a cross section of the float meter (19). A standard connector (63) on the top end of the meter attaches to a short conduit (62) connectable to the appliance fitting (64) of the adjustable suction regulator (20). At the bottom end of the flow meter, a standard connector (59) is attached to the suction conduit (58). It is typical to use suction in the range of 25-200 mm Hg in wound therapy. The flow indicator incorporates a flow restrictor (66) having an orifice (67) that is calibrated to restrict suction airflow to be less than 20 liters per minute when a controlled level of suction of 100 mm Hg is applied by the suction regulator (20).

[0060] As shown in Figure 4, the flow indicator has progressive sections (68, 70, 72, 74) with different inside diameters, having the narrowest section (68) at the bottom and progressively larger diameters in the three additional sections (70, 72, 74) progressing to the top. The outside barrel (76) of the clear tube has graduated markings (not shown) to indicate airflow rates. A float (78) serves as an indicator of flow through the system. When there is no airflow, the float will rest in the lowest section (68). This area is color coded red to indicate a blockage condition, such as a full canister or any occlusion in the fluid path. When the flow into the meter is low, preferably between about 50 cubic centimeters per minute to 300 cubic centimeters per minute, the clearance between the float and the bottom section of the indicator is such that the flow around the float will cause the float to rise into the next section (70). Thus, normal reference airflow will cause the float to rise a discernable amount into the next section. This area of normal operation is color coded green, indicating an acceptable condition.

[0061] The mass of the float works in cooperation with the clearance between the outside of the float and the inside of the tube. The float responds to airflow rate and fluid density and will rise to a level where the dynamic forces are in equilibrium. Typical flow indicators for other applications have continuously increasing inner diameters. Slight changes in flow rate cause the float to chatter up and down around a

height indicative of the flow rate. The use of discrete sections of uniform diameters, but increasing in progression, as the four sections (68, 70, 72, 74) in this indicator reduces the chatter and causes the float to move upward in stages. These stages are selected for discrete flows that provide key reference information regarding the suction applied to the wound.

[0062] If flow through the system increases beyond an acceptable level due to a leak in the wound dressing, the clearance around the float in the normal position may no longer be adequate to allow the float to remain in this position, and the increased flow will lift the float to a higher section in the indicator where the internal diameter is stepped up. Graduated labeling (not shown) on the outside of the indicator provides a visual indication of a moderate leak condition. Additional stepped up diameter sections are provided to indicate higher leak conditions. The stepped up diameters require a significant change in flow before the float will jump from one position to a higher one. This eliminates the jumpiness that would be encountered with a continuous taper inner diameter as common in flow meters for other applications. The stepped diameter sections reduce user interpretation, thus enhancing ease of use and safety.

[0063] The wound monitor instrument also incorporates a safety valve (80) that limits maximum suction to guard against the accidental application of excessively high levels of suction. It is typical to use suction in the range of 25-200 mm Hg for wound drainage and therapy. Consequently, the suction limiting feature may be set to limit the suction to approximately 200 mm Hg. A suction pressure relief chamber (84) is formed between the first flow restrictor (66) and a second flow restrictor (82) having an orifice (83) the same size as the first restrictor. A resilient valve mechanism (86) in the relief chamber serves as a release against the application of high levels of suction. The valve mechanism is spring loaded to a predetermined suction setting, such as 200 mm Hg. If the suction pressure in the relief chamber exceeds the predetermined setting, the valve mechanism will open and allow vent air to be drawn from a relief port (69) into the metering orifice to prevent excess suction from being applied to the patient.

[0064] Protrusions (75) may be provided on the top underside of the interior of the float meter adjacent the first flow restriction orifice to prevent the float from completely blocking the orifice entry to the pressure relief chamber, thus allowing air

passage even if a major leak occurs. This allows some suction to communicate through the system even at high airflow rates. Alternatively, the protrusions could be located on the top surface of the float.

[0065] The wound flow monitor instrument is also protected from sources of potential contamination in the form of particulate matter, aerosols and humidity by an air filter/dryer (21) located in the conduit between the instrument and the canister. The filter/dryer unit includes a particle filter for removing airborne dust as may be encountered when the wound monitor is disconnected from the collection canister for periodic changeover. It is also anticipated that a desiccant or other means of humidity control can be placed in the filter/dryer unit as required.

[0066] While this system has been described in the context of a hospital wall suction system, it can also be used with suction pumps. Some medical buildings may use electrical power pumps to provide suction for wound therapy. These can be moved, since the only restriction is the location of electrical outlets and the length of the power cord, but they are not truly portable. A system using portable battery powered pump is described below.

Portable Pump

[0067] In a portable pump embodiment (100) of the suction system as shown in Figures 5A, the suction source is a portable suction pump unit (102) instead of a stationary suction source. The pump connects to the same wound dressing subassembly (12) and waste collection canister (16) as were described above.

[0068] The pump (102) operates with low voltage DC and has an onboard (battery) power source. The pump will also run on wall power with a suitable ac/dc power converter, which may be combined with a battery charger to recharge the battery during use.

[0069] The pump is configured to produce controlled levels of negative pressure. As shown in Fig. 5B, the pump has an On/Off/Intermittent control switch (112) and pressure level selector dial (113) on its top panel. The pump power is turned ON using the control switch (112). A prescribed pressure setting is selected on the pressure selector dial, which allows set-point choices between 30 and 75 mm Hg.

[0070] In the schematic diagram of Figure 6A, the portable pump embodiment includes a positive displacement air pump (103), a variable speed DC motor (104), a tachometer (105), pressure control circuitry (106) and a fault detection/alarm system (108). In this embodiment the pump pressure control circuitry and the fault detection/alarm system may be hard wired solid state electric devices.

[0071] In the schematic diagram of a preferred embodiment in Figure 6B, the fault detection and alarm system includes a microprocessor (200). A suitable processor is a Microchip 16 Series, part number 16F688, although other similar programmable logic devices could be used.

The Independent Pressure Control System

[0072] Regardless of whether the pump uses a microprocessor or not, the pump's pressure control system is independent of the air flow monitoring function. The pressure control system functions similar to a standard compressor circuit. A pressure transducer (not shown) monitors the negative pressure produced at the pump, and is preferably located in the conduit between the waste collection canister (16) and the pump (102). The compressor control circuit (106) includes a solid state logic device. The user selects a pressure setting using the selector dial (113) to change the resistance of a variable resistor and produce an electrical signal representing the selected pressure. The control circuit (106) receives the selected pressure setting as an input, and sets an upper and lower limit of pressure that is related to the selected pressure. This range between upper and lower limits is selected to provide a reasonably stable suction level while minimizing the on-off cycling of the pump motor. A range of approximately 10 mm Hg is preferred for patient comfort and to minimize noise. The control circuit (106) will function to maintain the pressure sensed by the transducer between the two limits. Such control circuits are commonly employed in industrial applications as well as in hospital central suction systems.

[0073] When the pump is initially turned on by the On/Off/Intermittent switch (112), the control circuit (106) starts the pump running until the transducer detects pressure at or exceeding the upper limit of the pressure range set by the control circuit. The pressure control circuit (106) has a comparator (not shown) that is continually comparing the pressure signal from the pressure transducer to the set point limit signals

as chosen by the operator via the pressure selector dial (113). Once the upper limit is reached, the pressure control circuit (106) turns the pump Off. Normal reference air flow in the conduit will cause pressure at the transducer to decay towards the lower limit of the control range. Once the detected pressure has reached the lower control limit, the control circuit (106) will turn the pump back On, and the process is repeated. Thus, the pressure transducer senses the current negative pressure and the control circuit (106) turns the pump On and Off accordingly to maintain negative pressures that are within the selected desired range.

[0074] The motor (104) is preferably a variable speed DC brushless motor, however other styles of DC motors are acceptable, as well as AC motors that can be equipped with variable outputs. With the variable speed motor, the speed is controlled via a pulse width modulation (PWM) feature of the control circuit (106). The variable speed control allows for efficient use of DC power.

[0075] The positive displacement pump (102) in the preferred embodiment uses a DC diaphragm style pump with inlet and outlet check valves. The diaphragm pump crankshaft is operationally connected to the shaft of the variable speed motor. Other positive displacement pumps may be used, such as peristaltic, piston, syringe or rocking piston pumps.

[0076] A tachometer (105) can be used to indicate motor or pump shaft rpm. For example, Hall sensors are commonly employed on DC brushless motors, as well as encoders, to indicate rpm. It is also possible to sense back EMF in brush versions of DC motors to determine motor shaft rotation speed. In an AC pump, an oscillating bar with a magnet mounted to an end is excited by an AC coil, thus driving a diaphragm. In that case a count of the oscillations delivered by the coil can be used as an indicator of pump speed. Each of these and other forms of pump or motor speed sensors is included in the generic term tachometer, and can be used as the flow rate monitoring instrument, where pump speed or displacement is measured as a surrogate for direct airflow measurement with a positive displacement pump.

[0077] As described above, the pressure control circuitry (106) will run the pump as necessary to maintain suction sensed by the transducer within the desired range of

the selected negative pressure set point. The pump's On-time duration is increased or decreased as required by the pump control circuitry (106), at an efficient motor speed as determined by the pulse width modulation feature of the control circuitry, to maintain the negative pressure in the range established by the selected set point. Thus, the pressure control circuit operates on sensed pressure, and not on sensed air flow. This allows the pressure control to be independent of the flow detection and monitoring and flow status display capability of the system.

The Flow Detection System

[0078] As shown in Fig 6A, a fault detection system (108) can be a circuit that is adapted to monitor pump activity as an indicator of the flow rate of air through the wound therapy and waste collection lines, coupled with an annunciator (114) to provide audible and visual indication of status of operation. This fault detection circuit (108) is a separate circuit that is independent of the compressor control (106). Preferably the fault detection system includes sensors of pump motor activity that provide input to a microprocessor which determines a flow rate based upon the motor activity input, identifies deviations from reference flow rate, and provides the annunciator signal identifying abnormal status of operation. In a preferred embodiment as described below, the fault detection circuit can include a microprocessor.

[0079] A preferred embodiment of portable pump unit (200) is depicted in the schematic diagram of Fig 6B. The pump (203) is as described above, a diaphragm style positive displacement pump with inlet and outlet check valves, and is powered by a variable speed brushless DC motor (204). The unit can be powered by wall outlet power with a power cord (205) supplying electrical power through a power converter and battery charger module (207) which also contains a 12 volt battery. The unit can receive DC power either from the converter or from the battery when used un-plugged. The pressure control circuitry (206) operates as described above to maintain pressure selected at the selector dial (213).

[0080] The unit also includes a microprocessor (210) that is involved in the flow monitoring and system status detection functions. In this embodiment, motor or pump revolutions are counted as an indication of the air volume that has passed through the positive displacement pump and provide an input to the microprocessor (210). A

discrimination algorithm in the microprocessor programming takes the count of motor revolutions and determines a flow rate. This flow rate is compared to the known reference flow rate to determine fault conditions. The flow rate is converted into a signal that illuminates a display bar on the flow rate annunciator (214). A flow rate that is less than the reference flow is indicated as abnormal operation on the annunciator as an occlusion in the circuit, most commonly a full canister. A flow rate that is comparable to the reference flow rate produces an annunciator indication of normal operation. Flow rates that are higher than the reference flow rate will produce abnormal annunciator indications that the circuit is leaking to alert the caregiver to address the seal of the wound cover.

[0081] Where the pump is independently turned On and Off by the pressure control circuit to maintain set point pressure, the pressure sensed by the transducer will oscillate between the upper and lower control limits. The period of this oscillation is related to the leakage in the wound dressing. The higher the leakage, the shorter the period. Thus, the time intervals between the pump turning On or Off could be detected by the microprocessor and used as a rough measure of air flow rate. Where the motor speed is also controlled via a pulse width modulation (PWM) control to make the use of DC power more efficient, however, the microprocessor can also correlate the On/Off intervals with pulse rate to determine airflow rate. In normal operation, the positive displacement pump will output a given number of pulses for each revolution of the pump. The pulse signals can be supplied as an input to the microprocessor. These pulse signals are used to determine the number of pumping strokes the pump has output and are a very close approximation of pump volume. The flow monitoring programming in the microprocessor continually counts the pulses being output from the pump to represent volume of air flow. When taken in combination with a time measurement, these pulses per unit time represent airflow rate. In a presently preferred embodiment, the time measurement is based on the Off cycles of the pump motor. From the time the pump turns Off, until the next time the pump turns Off, the microprocessor counts the pulses and divides by the time between each motor OFF condition to determine the flow rate in the conduit.

[0082] It is sometimes desirable to provide suction in an intermittent fashion to benefit the healing process. Prior processes involve allowing the system to vent to atmospheric pressure for a period of time to allow for reperfusion of tissue. Allowing the system to completely vent to atmosphere results in the complete loss of suction on the dressing system and any benefit that suction could play in maintaining an air tight seal around the wound. The present invention solves this problem by varying the suction between two distinct levels; a first level selected by the pressure selection dial (113) and a second level of 20-25 mm Hg. The selected higher level is used to apply the beneficial therapeutic effects of suction. The second reduced level is below capillary bed pressure, so reperfusion of tissues will occur in this lower stage, while the wound dressing maintains at least some level of suction to help keep the dressing seals in place and to maintain the reference airflow and prevent reflux and clotting in the lines. With this type of intermittent pump operation, the reference airflow should be selected such that it is maintained even at the reduced level, or else the alarms associated with low airflow should be disarmed by the microprocessor during reduced suction intervals as well as the ramp-up and ramp-down intervals.

[0083] The microprocessor (210) can rest the selected pressure to cause intermittent suction. When the On/Off/Intermittent switch is set to Intermittent mode, the programming in the microprocesor uses a time interval for switching between normal selected pressure and the lower level. To enter the lower pressure cycle of the intermittent mode, the microcontroller activates a transistor that adds a resistance to the compressor comparator circuit. In effect, the microcontroller has re-set the pressure control circuitry to a lower selected pressure. Thus, while the microprocessor does not directly control the pressure control system, the microprocessor can re-set the selected pressures between the higher and lower levels at timing intervals selected by input to the microprocessor.

[0084] Faults in the suction therapy system are detected as deviations from the expected flow through the system. The flow detection system uses the reference airflow produced by the calibrated vent on the end of the suction tube calibrated to approximately 50 - 100 cc/min to provide a flow signal indicative of normal operation. If the flow detection system determines the pump is not running at a normal duration to

maintain set-point negative pressure, it will alert the caregiver via a visual and audible alarm.

[0085] An increase in the On time of the motor is proportional to increase of air flow in the system. The microprocessor uses an algorithm to correct the airflow based on the actual pressure in the circuit. Any leak in the dressing system will be compensated for by an increase in the On time of the pump. As the On time increases to equate to a flow of approximately 3 liters per minute, an indicator will light on the flow annunciator display (214) of the unit to alert the caregiver to the fact that the dressing system has a leak. If the caregiver is able to correct the leaking dressing, the indicator will turn off. If the fault condition is not addressed (by re-sealing the wound site) within a one-minute timeframe, the microprocessor will activate an audible alert. Even when a leak condition exists, however, the pump will continue to run under the control of the pressure control system, delivering some level of suction until the condition is corrected or the pump is turned off.

[0086] The flow detection system will also sense the loss or drop of the reference airflow. There are a number of fault conditions which will cause the reference air flow to be reduced, including the lines to the waste canister becoming clogged with wound exudates, or being crimped shut by bending or squeezing. These conditions also result in the loss of negative pressure at the wound. This reduced reference air flow results in reduced motor on time that is sensed by the flow detection system and causes a visual indicator to indicate blockage condition.

[0087] The pump may also have an onboard compliance monitor as part of the timing function of the microprocessor. A compliance indication (159) alerts the caregiver to deviations from the normal application of suction to the wound over time and is a useful adjunct to the application of negative pressure wound therapy. The compliance monitor may compute the number of hours that suction has been within ±5 mmHg of a set point. Medical experience has shown that suction should be applied for 22 of any 24 continuous hours to be effective. This readout can be presented a number of ways to show the number or percentage of compliant hours of suction therapy.

Waste Collection Canister and Fill Indicator

[0088] The pump unit (102) also includes a docking station (160) for the waste collector located between the wound dressing and the pump for collecting liquids aspirated from the wound. As presently preferred, the waste collector is a transparent plastic canister (16) having right circular cylinder profile and fill-level markings in a band (170) extending along the height of the cylinder, and having a connection fitting (54) with an O-ring seal. The portable pump docking station (160) supports the canister. The docking station has a concave profile conforming to a half section of the canister and a semi-circular base (162) to support the canister when one is docked. The pump has a releasable latch fitting (164) in the middle of its upper wall that is adapted to receive the connection fitting (54) of the canister. The canister fitting is inserted into the latch fitting (164) and locked in place by the latch. The canister may be released and removed by depressing the canister release button portion (166) of the latch.

[0089] The pump also provides the ability to detect a filled canister without the need to measure differential pressures across a membrane. Differential pressure measurement can be problematic in that partially clogged membranes can lead to erroneous readings and interpretations. In this embodiment, the pump (102) employs positive level detection as a direct indication of the fill status of the canister. The pump may include a level detector sensor (218 in FIG 6B) proximate to the canister docking station for detecting when the level of waste in the canister exceeds a level which indicates a filled canister condition. A level sensor can take many forms, including a capacitance detector such as a Model# BC 10-QF5 sensor manufactured by Turck, Inc. This detector can be positioned in the pump housing at a desired level and has the ability to read a change in capacitance as caused by the presence of an ionic fluid. The detector can sense this changed environment through the pump housing, so there are no exposed elements. Capacitance type detection is also tolerant to conditions such as mist or fogging. Other positive level sensing mechanisms can be used such as optical, ultrasonic, contact wire, float systems and the like.

[0090] Since the patients may be mobile or need to be transported, there is a potential that agitation and motion can create an artifact where fluid may splash and create a false positive indication of a filled canister and subsequently trigger an

unwarranted signal or alarm. A software algorithm may be used by the microprocessor to minimize the likelihood of this false indication. The algorithm incorporates a time delay and a sampling rate. A sampling rate of 10 milliseconds and a delay of 4 seconds is an effective set of parameters that reduces false full indications due to a motion artifact. Preferably the algorithm is programmed into the microprocessor pump control.

[0091] The direct level detector also allows the system to distinguish between a filled canister and an occluded condition caused by other blockage in the conduit that is detected by deviation from reference airflow. The direct level sensor provides a signal that can illuminate a different array of visual and audible alarms than a lower than normal air flow indication. Providing the clinician a distinction between canister filled condition and an occlusion simplifies operation and makes the system easier to use and less prone to user error.

Timing Subsystem

[0092] The pump unit may have a timing subsystem for recording and accumulating time units corresponding to periods of time when the pump is running. Preferably the timing subsystem uses programming in the microprocessor (210) to record and accumulate the time units based upon inputs from other sensors. For example, the timing can be started and stopped by signals from the ON/OFF/Intermittent power switch, or signals that can detect when the pump is running from a tachometer or other sensor. The timing subsystem or programming in the microprocessor preferably also includes a time reporting routine for providing reports of the time units that the pump is running. The time reports may include a record of run-time intervals, a record of the date and duration of run-time intervals, a record of total accumulated run-time, a record of accumulated compliant run time, and a record of run time remaining on a pre-set run time period.

[0093] The timing subsystem may also be tied into alarms which indicate abnormal operating condition due to leak or occlusion. This will allow the timing subsystem to detect and record total pump operation time and compliant operation time. Compliant operation my be defined by therapeutic convention. For example, compliant time is sometimes identified as normal suction application for 22 hrs of a 24 hour period. The

time reporting subsystem may produce reports of complaint operation time in addition to pump run-time.

[0094] The timing subsystem may also be used to indicate time remaining to scheduled maintenance or cleaning, or to indicate time used or remaining on a billing plan where the payments for usage are based upon time units either on return or pre-paid in advance. When the pump is sold or leased in this manner, the timing subsystem has the ability to record and accumulate time units corresponding to periods of time when the pump is running and for providing reports of run-time, including compliant run time when the wound treatment system is operating normally.

Status Indicators and Alarms

[0095] The system status annunciator may be in the form of a bar meter (114) color coded and graduated to provide a visual indication that the flow through the pump is within a range required to maintain the reference airflow when the system is in normal operation; and conversely indicate that the pump is running faster than required to maintain the reference airflow, indicating air leakage in the system, or is running slower than required to maintain the reference airflow, indicating air blockage in the system. The pump may also provide an audible indication of abnormal operation, such as a beeper tone.

Error Detection and Display

[0096] The pump may also have warning or caution lights (116, 118, 120) indicating pump operating parameters, or errors other than those that are detected from reference airflow such as low battery charge. Electronic controls provide the ability to enable numerous combinations of visual and audible indications of flow detection faults and other errors. In the microprocessor embodiment of Fig 6B, a visual error indicator display (216) that is separate from the flow rate annunciator (214) provides additional trouble shooting assistance. These errors are detected by signals from sensors to the microprocessor. The microprocessor in turn sends signals as an alphanumeric display to the error display (214) that correlate to the following errors: overpressure, missing canister, transducer failure, low battery, low operating time remaining, and attachment of incorrect power supply.

[0097] Overpressure is the condition where a runaway pump could cause potentially high pressures to be delivered to the patient. The microprocessor's error detection software continually polls the output of the pressure transducer and compares it to a stored maximum allowable pressure. If the maximum allowable pressure is exceeded for a predetermined time period, then the microprocessor shuts the pump down and an Overpressure error is indicated on the error display.

[0098] A missing canister condition occurs if the pump is activated without a waste collection canister connected to the fitting. This condition can occur at start-up, and is detected by the error detection software as air flow through the system exceeding a certain level without a corresponding minimal increase in pressure. The detection flow rate for missing canister is typically set to be greater than the increased flow that would be expected from a wound dressing that was removed or compromised. When so detected, a Missing Canister error is indicated on the error display.

[0099] A pressure transducer failure can take two forms: an open circuit (no pressure reading) or an excessively high reading indicative of high vacuum. The latter is straightforward since it would be interpreted as an Overpressure (described above) and result in a fail-safe deactivation of the pump. The open circuit failure appears as zero pressure output. Therefore, if the error detection system software detects air flow but zero pressure, a Transducer Failure error is indicated on the error display.

[0100] A low battery charge is determined by the error detection software polling the battery output voltage when the pump is not plugged into an external electrical source. When a threshold low voltage level is crossed, a Low Battery error is indicated on the error display.

[0101] Low operating time remaining is associated with the timing feature of the pump when it is used to indicate time remaining until scheduled maintenance service or time remaining on a pre-paid rental plan. The timing system constantly accumulates run time and time remaining to a target time, such as the number of pre-paid hours. The error detection system can be set to a time remaining threshold, such that when the accumulated time indicates that time remaining has dropped below the threshold, a Low Time error is indicated on the error display.

[0102] Incorrect power supply detection is to guard against providing excessive voltage to the system. This is accomplished by comparing the input voltage to a set maximum level and detecting if voltage exceeds the maximum level. The system software detects the excess voltage and shuts down the pump, and an Incorrect Power error is indicated on the error display.

Collection Line Pulse System

[0103] The collection line pulse feature is intended to ensure that the collection line is maintained as clear as practical to minimize the amount of fluid in the line and ensure accurate delivery of the negative pressure. When the deviation from reference air flow begins to indicate an occlusion, the microprocessor motor controller can re-set the selected pressure to a higher level, which causes the pressure control circuitry to start the pump or increases pump speed. This pump activation causes a pressure pulse of transient high negative pressure output from the pump to clear the line between the patient and the collection canister. The microprocessor is programmed such that the pressure pulse is initiated prior to the illumination of an occlusion indication. The occlusion indication will not illuminate if the pressure pulse is followed by decay in the pressure reading on the pressure transducer. Decay in the pressure reading is indicative of a clearing collection line and therefore eliminates the concern of occlusion.

Safety Elements

[0104] System redundancy and therefore enhanced safety is accomplished by making the pressure control system operate independently of the monitoring and error detecting software. The pressure transducer is employed in a conventional compressor circuit to control the level of applied negative pressure. Should the compressor circuit fail, then the software has the ability to shut down the system and should the software fail, the independent pressure control will provide controlled suction to the patient.

[0105] The pump may have a charcoal filter element for controlling odors that may emanate from the patient through the pump. This element is placed on the outlet of the pump and can be readily changed and replaced. Also, desiccants can be used in conjunction with the filter to minimize moisture in the exhaust from the pump.

[0106] Positive displacement pumps typically employ check valves which make noise. The pump employs a backpressure device in the form of a leaf spring that is placed over the outlet of the pump to reduce the noise emanating from the pump.

Target Meter Alternative

[0107] There are other devices for determining the flow through the system that could be employed as leak detection devices in a wound dressing system operating with a reference airflow. These devices measure airflow directly, and thus can be used with non positive displacement pumps and wall vacuum sources as well as with positive displacement pumps. As shown in Figure 7, a target meter (120) is a reliable device for flow detection that is insensitive to changes in pressure. The target meter (120) employs an inlet orifice (122) and a target (124) typically placed in close proximity to the orifice. The target is attached to a shaft (126) and pivots on points (128) or an armature. A light torsion spring (not shown) may be used to keep the target in close proximity to the orifice. The extension of the shaft is placed outside of the flow path. As airflow enters the orifice, the target is forced away from the orifice. A proximity sensor, such as a reed switch (130) is so placed as to detect the positions of a magnet (132) on the end of the shaft extension and thus the presence or absence of flow in the circuit as well as measuring flow rate. A target meter could be placed between the waste collection canister and the pump or at the outlet of the pump, or between the waste collection canister and a stationary suction source to provide analogous flow rate information as previously described.

Flow Measurement Alternatives

[0108] Other flow detection devices that could be used alone or in conjunction with a suction source include a hot wire anemometer that determines flow as a function of the cooling of a wire in a flowing air stream, a rotameter with an optical detector that senses the position of a float, a turbine meter that rotates when flow is applied. These flow detection systems are generally insensitive to changes in pressure. A hot wire anemometer could be placed between the waste collection canister and the pump or at the inlet of the pump, or between the waste collector and or a stationary suction source. These alternative flow sensors allow the use of other styles of pumps that are not positive displacement, such as vane pumps and scroll pumps. Almost any flow

instrument could be used, including, for example, differential pressure (DP) cells that provide an indirect measure of flow rate.

[0109] When any fault condition is determined within the system, the pump will continue to run, delivering a sub-optimal level of suction, until the condition is corrected or the user powers the system off, since a sub-optimum level of suction applied to the wound is preferable to no suction at all.

Therapeutic Fluid Delivery and Reference Flow

[0110] In the embodiments described above, the reference flow for discerning between normal and abnormal operation has been ambient air supplied to the suction conduit through a vent. A reference airflow could be provided, however, in the form of a therapeutic mixture, such as oxygen enriched air, nitric oxide, heated humidified air or an aerosol containing medication droplets or particles. Such a configuration is shown in Figure 8. A source of therapeutic mixture (115), such as an oxygen regulator or a nebulizer, is connected to a conduit (117) leading to the wound. The mixture is conveyed through the conduit under or through the wound cover (152) and released into the wound packing (154) adjacent the wound contact material (156). Part of this mixture will be absorbed, but enough could be returned through the suction conduit (157) to provide a reference airflow when the flow has settled into equilibrium.

[0111] While the airflow monitor could be associated with a portable pump or in front of the appliance fitting of a suction regulator, as described above, an airflow monitor (119) could be provided between the therapeutic mixture source (115) and the wound cover (122). Since the part of the conduit beneath the cover would be contaminated in use, a detachable disposable tube (121) would be used for the section of conduit from the monitor to the wound packing. Thus, the invention can provide for the maintenance of suction therapy on a wound as well as the ability to monitor the application and removal of therapeutic substances to the wound.

[0112] Although the invention has been described and illustrated with respect to several embodiments described above, it should be understood the invention may be embodied in other forms without departing from its scope or attributes. Hence, the

scope of the invention should be derived from the claims that follow, recognizing that the claim language may literally encompass structure not specifically described.

Solventum-Exhibit 1013-0886

Claims:

We claim.

1. A portable suction pump for producing negative pressure in a system for applying suction to a wound, the pump comprising;

(a) a flow rate monitoring system to monitor airflow through a conduit from a wound dressing to the pump as indicative of the level of negative pressure applied to the wound and to detect deviation from a reference flow rate, such that the deviation from the reference flow can be used as an indication of abnormal condition such as leakage of the wound dressing or occlusion in the conduit;

(b) a user operable pressure selector to enable a user to select a negative pressure pump output within a range of negative pressures; and

(c) a pressure transducer and a pressure control circuit for controlling the operation of the pump to maintain the pressure sensed by the transducer between upper and lower limits around the selected pressure, wherein the pressure control circuit can operate to control operation of the pump without input from the flow rate monitoring system.

2. A pump as in claim 1, wherein the flow rate monitoring system is controlled by a microprocessor.

3. A pump as in claim 2, wherein the pressure control circuit uses solid state electronic devices that can control the operation of the pump reference without input from the microprocessor.

4. A pump as in claim 2, further comprising:

a waste collector canister located in the conduit between the wound dressing and the pump for collecting liquids aspirated from the wound, the canister having a connection fitting; and

the pump having a docking station to support the canister and a fitting adapted to receive the connection fitting of the canister.

5. A pump as in claim 4, wherein the pump fitting includes a releasable latch.

6. A pump as in claim 4, further including a canister-fill sensor in the pump proximate to the canister docking station for detecting when the level of waste in the canister exceeds a level which indicates a filled canister condition.

7. A pump as in claim 6, wherein the canister-fill sensor is a capacitance detector.

8. A pump as in claim 6, wherein the canister-fill sensor provides to the microprocessor a signal representing a level of waste collected in the canister and the microprocessor includes an algorithm to be applied to the signal to reduce the likelihood of an erroneous indication of a full canister.

9. A pump as in claim 4, wherein the microprocessor provides signals to an annunciator for displaying a visual indication of airflow through the pump.

10. A pump as in claim 9, wherein the annunciator is a bar meter that is color coded and graduated to provide a visual indication of air flow through the pump.

11. A pump as in claim 10, wherein the annunciator indicates when the airflow through the pump is within a range of the reference air flow that is associated with normal system operation and conversely indicates when a deviation from the reference airflow is associated with an abnormal operation.

12. A pump as in claim 11, further including an error indicator display for displaying a visual warning of one or more system errors that are not associated with deviation of airflow through the pump from reference airflow.

13. A pump as in claim 12, wherein the system errors are chosen from the group consisting of: overpressure detection by the pressure transducer, pressure transducer failure, waste collection canister not attached, low battery voltage, attachment of incorrect power supply, and low operating time remaining.

14. A pump as in claim 2, further comprising the microprocessor having programming to reset the selected pressure between a higher and lower pressure level when intermittent pressure therapy is desired.

15. A pump as in claim 14, wherein the microprocessor has programming to increase the selected pressure when the deviation from reference air flow begins to indicate an occlusion to cause the pressure control circuit to start the pump or increases pump speed to cause a pressure pulse output from the pump to clear the line between the patient and the collection canister.

16. A pump as in claim 15, wherein the microprocessor is programmed such that the pressure pulse is initiated prior to the illumination of the occlusion indicator, and the occlusion indicator will not illuminate if the pressure pulse is followed by decay in the pressure reading on the pressure transducer.

17. A pump as in claim 2, wherein the microprocessor includes timing programming to record and accumulate the time units based upon inputs from other sensors.

18. A pump as in claim 17, wherein the timing programming also has a time reporting routine for providing reports of the time units that the pump is running.

19. A pump as in claim 18, wherein the reports include one or more reports chosen from the group consisting of: a record of run-time intervals, a record of the date and duration of run-time intervals, a record of total accumulated run-time, a record of accumulated compliant run time, and a record of run time remaining on a pre-set run time period.

20. A system for applying suction to a wound, comprising;

(a) a wound dressing, including a wound cover that is sealable to skin surrounding a wound;

(b) a conduit having one end operatively associated with the wound dressing to communicate suction to the wound, and an opposite end operatively associated with a suction pump;

(c) a transparent plastic waste collector canister located in the conduit between the wound and the pump for collecting liquids aspirated from the wound, the canister having right circular cylinder profile and fill-level markings in a band extending along the height of the cylinder, and having a connection fitting with an O-ring seal; and

(d) the pump being a portable pump having a docking station to support the canister, wherein the docking station has a concave profile conforming to a half section of the canister and a releasable latch fitting adapted to receive the connection fitting of the canister.

21. A system as in claim 20, further including a sensor in the pump proximate to the canister docking station for detecting when the level of waste in the canister exceeds a level which indicates a filled canister condition.

22. A system as in claim 21, wherein the sensor is a capacitance detector.

23. A system as in claim 21, further including the pump having a microprocessor, and the sensor providing to the microprocessor a signal representing a level of waste collected in the canister, and the microprocessor including an algorithm to be applied to the signal to reduce the likelihood of an erroneous indication of a full canister caused by liquid sloshing inside the canister.

24. A system as in claim 23, further including the pump having a charcoal air filter disposed between the releasable latch fitting and an air discharge port from the pump.

25. A system as in claim 23, further including the pump having a leaf spring sound damper disposed between the releasable latch fitting and an air discharge port from the pump.

26. A portable suction pump for producing negative pressure in a system for applying suction to a wound, the pump comprising;

(a) a pressure control circuit for controlling the operation of the pump to maintain the pressure between upper and lower limits around a pre-selected pressure, and;

(b) a fault detection system to detect deviations in the level of negative pressure applied to the wound; wherein the fault detection system can operate independent of the pressure control circuit.

27. A portable suction pump as in claim 26, wherein the fault detection system includes a flow rate monitoring system to monitor airflow through a conduit from a wound dressing to the pump as indicative of the level of negative pressure applied to the wound and to detect deviation from a reference flow rate, such that the deviation from the reference flow can be used as an indication of abnormal condition such as leakage of the wound dressing or occlusion in the conduit.

28. A portable suction pump as in claim 27, where the degree of abnormality is indicated by a color coded display.

29. A portable suction pump as in claim 26, further including a microprocessor programmed to increase the pump pressure when the deviation from reference air flow begins to indicate an occlusion by starting the pump or increasing pump speed to cause a pressure pulse output from the pump to clear the line between the patient and the collection canister.

30. A portable suction pump as in claim 30, wherein the pump has a visual occlusion indicator and microprocessor is programmed such that the pressure pulse is initiated prior to the illumination of the occlusion indicator, and the occlusion indicator will not illuminate if the pressure pulse is followed by decay in the pressure reading on the pressure transducer.

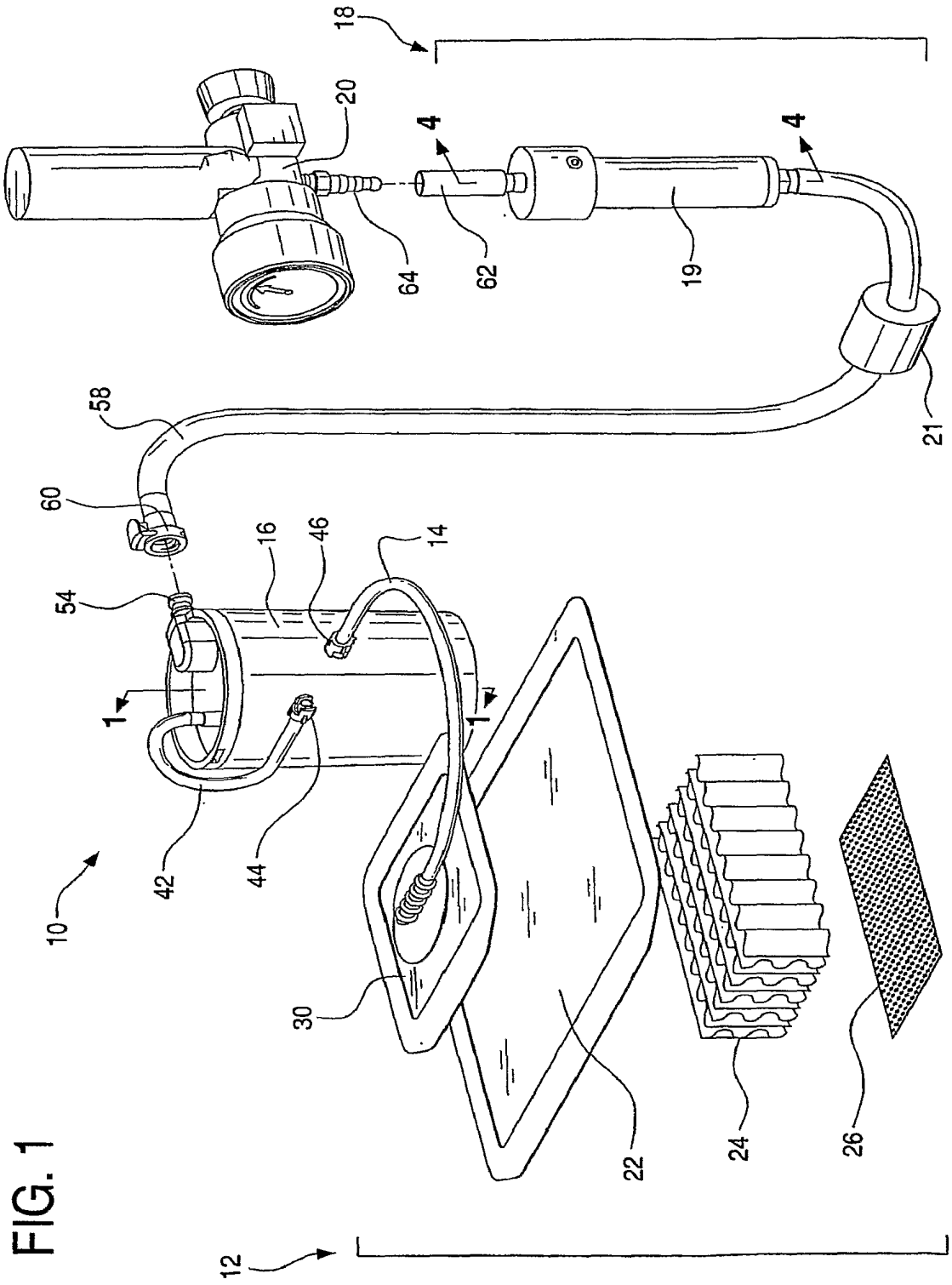


FIG. 1

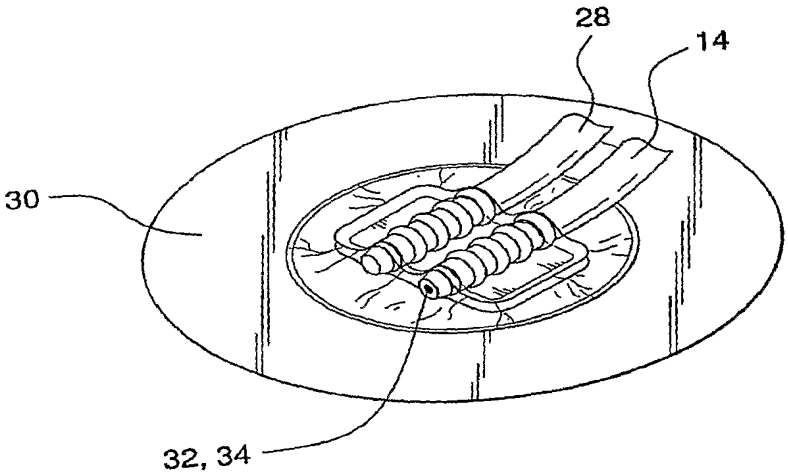


FIG. 2

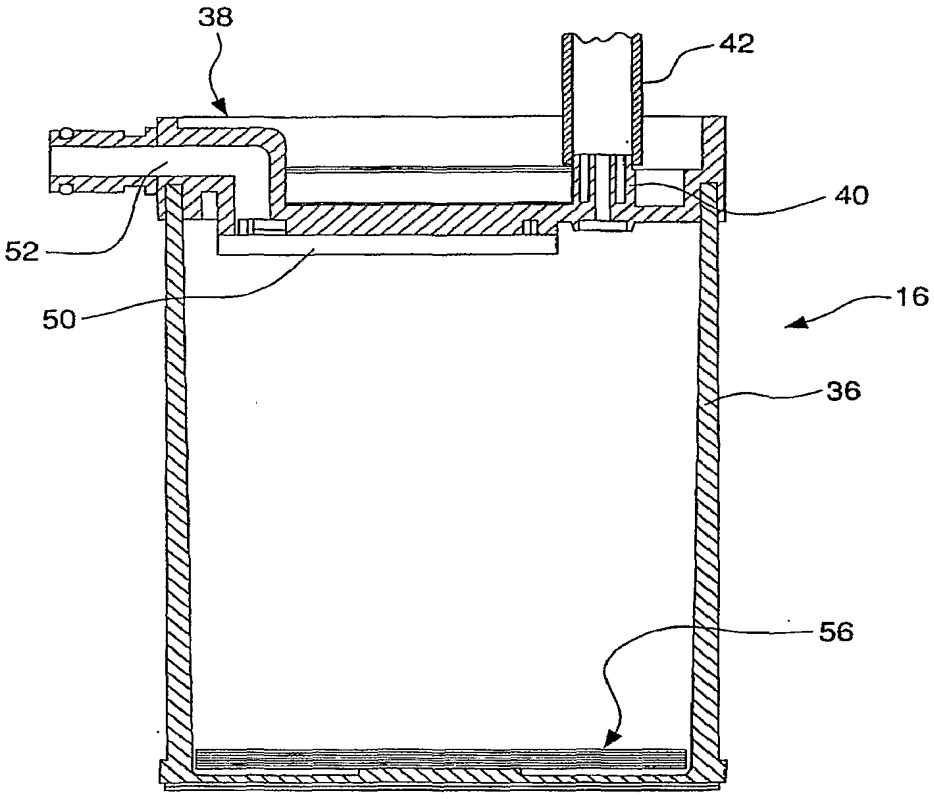


FIG. 3

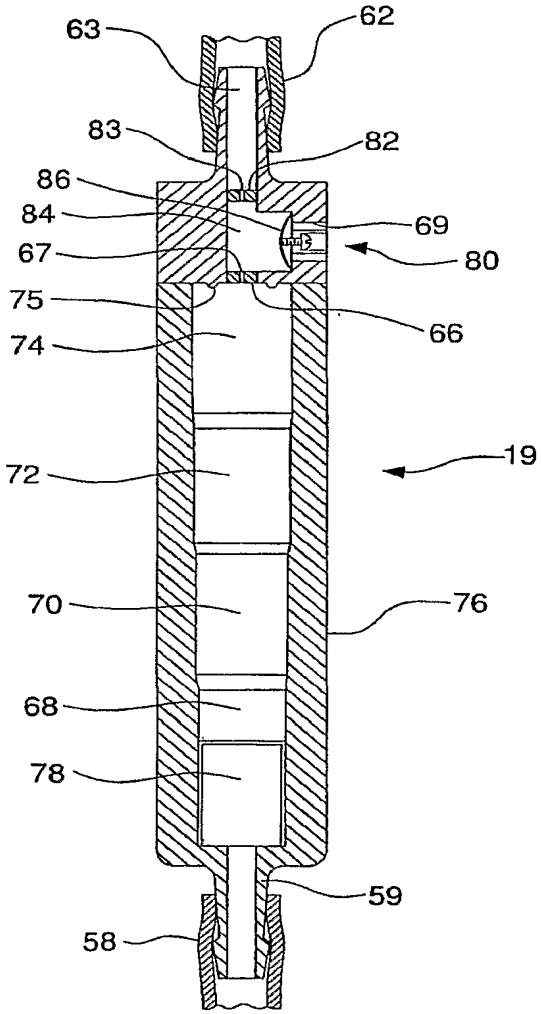


FIG. 4

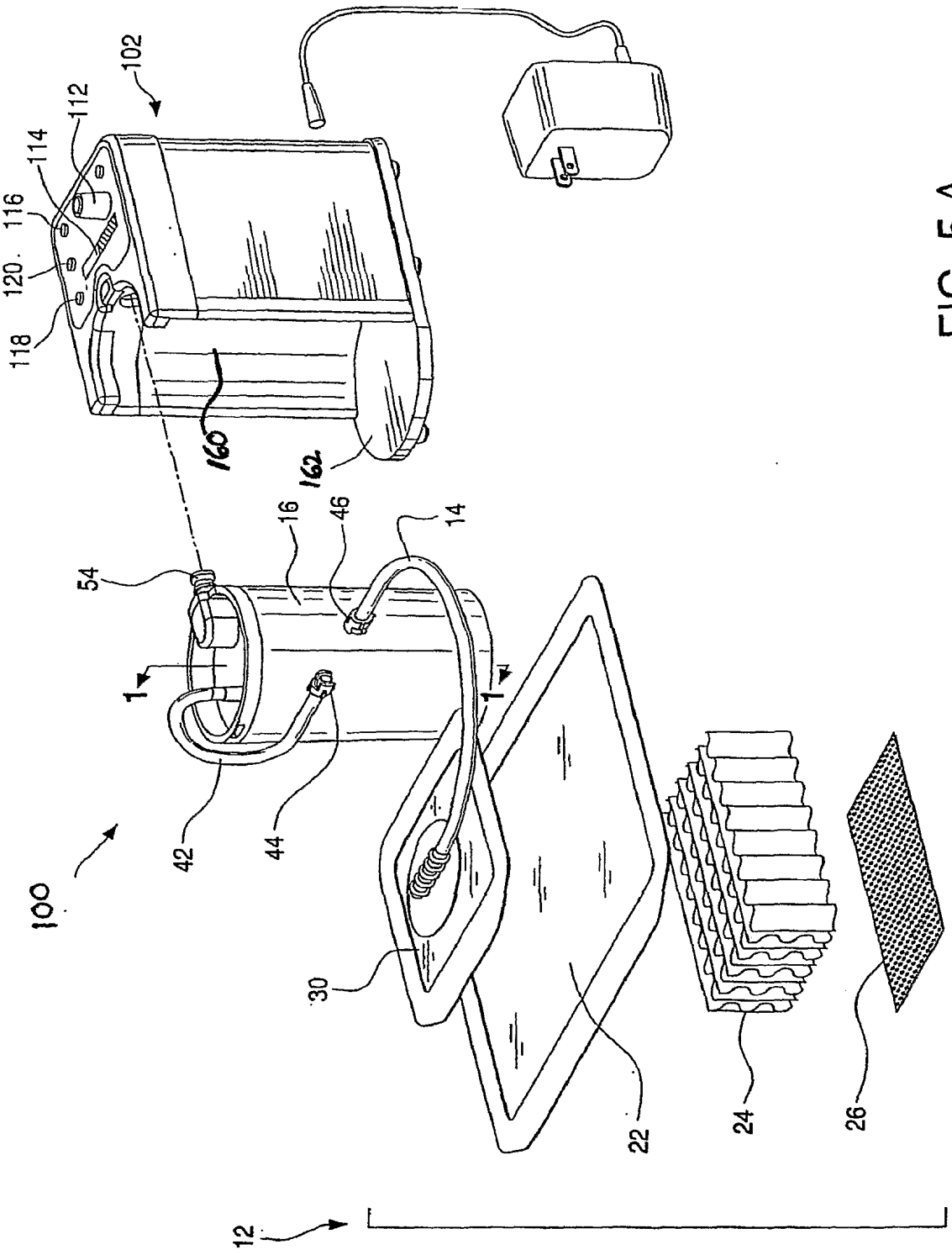

102
112
114
116
120
118
160
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26
12

FIG. 5A

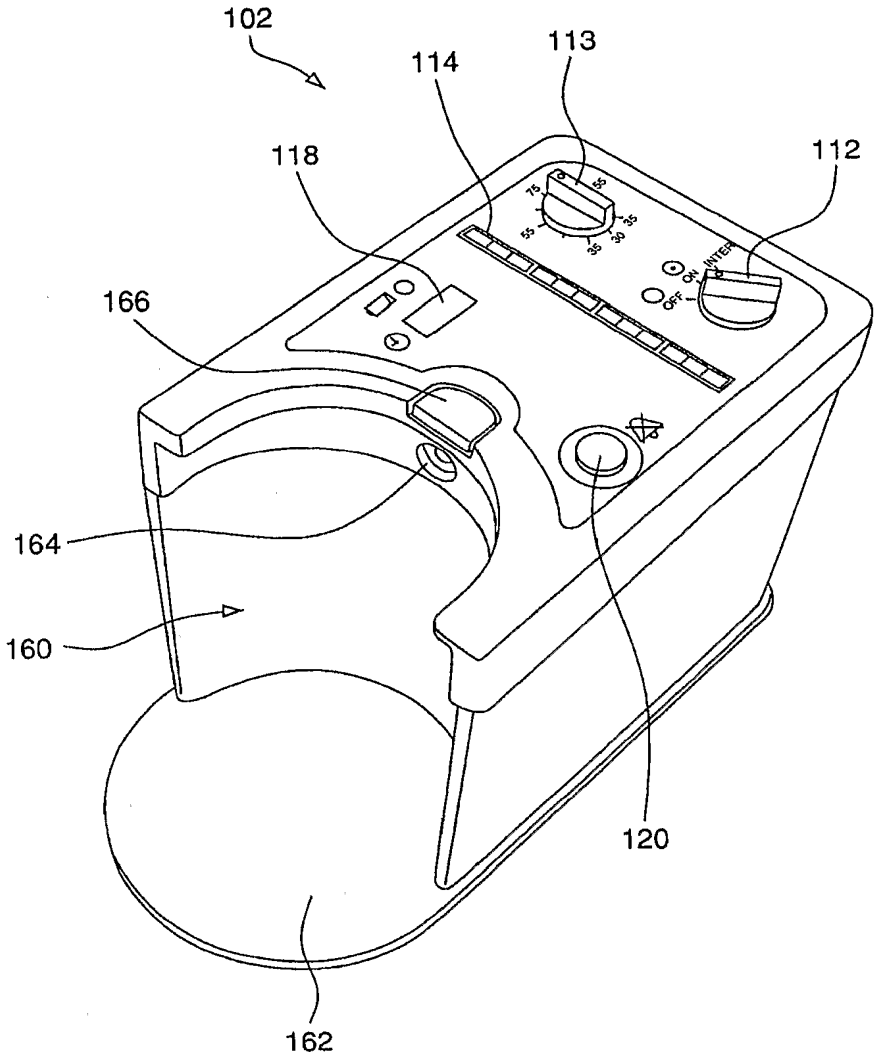


FIG. 5B

Solventum-Exhibit 1013-0897

WALL POWER
POWER CIRCUITRY BATTERY
USER INPUTS
COMPRESSOR CONTROL CIRCUIT
104
105
103
106
FAULT DETECTION CIRCUIT
108
114
ANNUNCIATOR
NORMAL OPERATION
ABNORMAL OPERATION
COMPLIANCE
LOW BATTERY
116
118
159
120

FIG. 6A

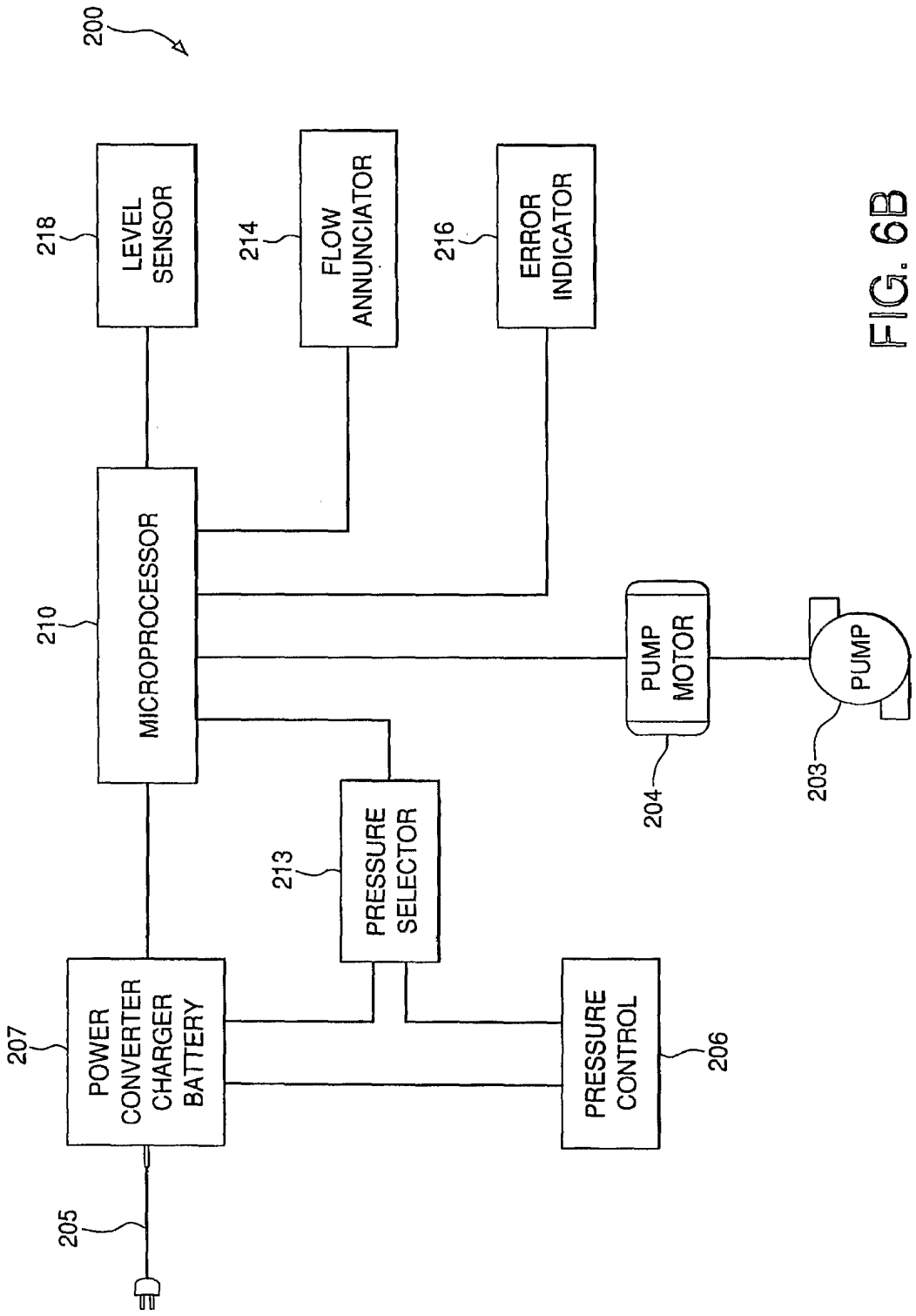


FIG. 6B

Solventum-Exhibit 1013-0899

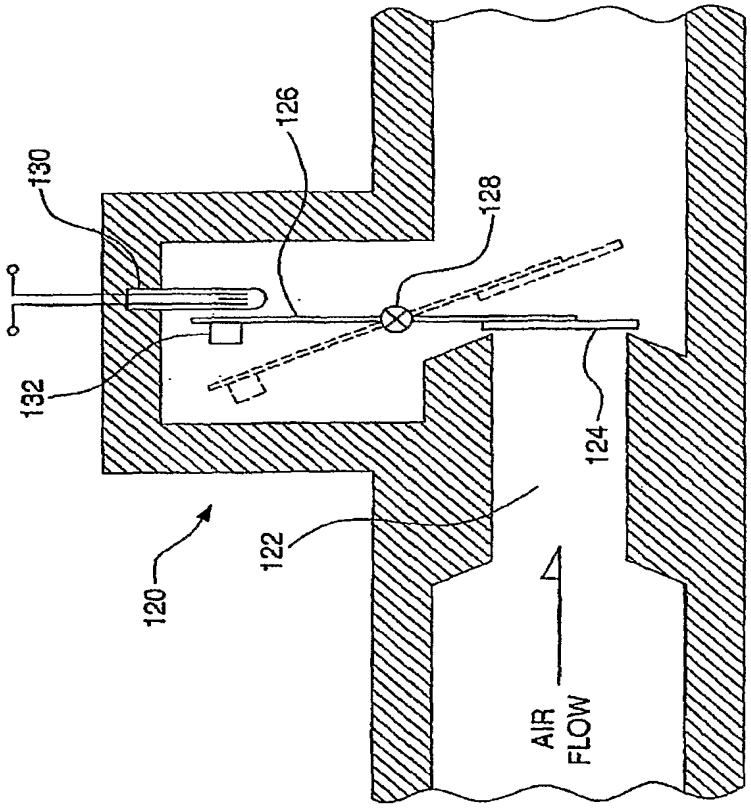


FIG. 7

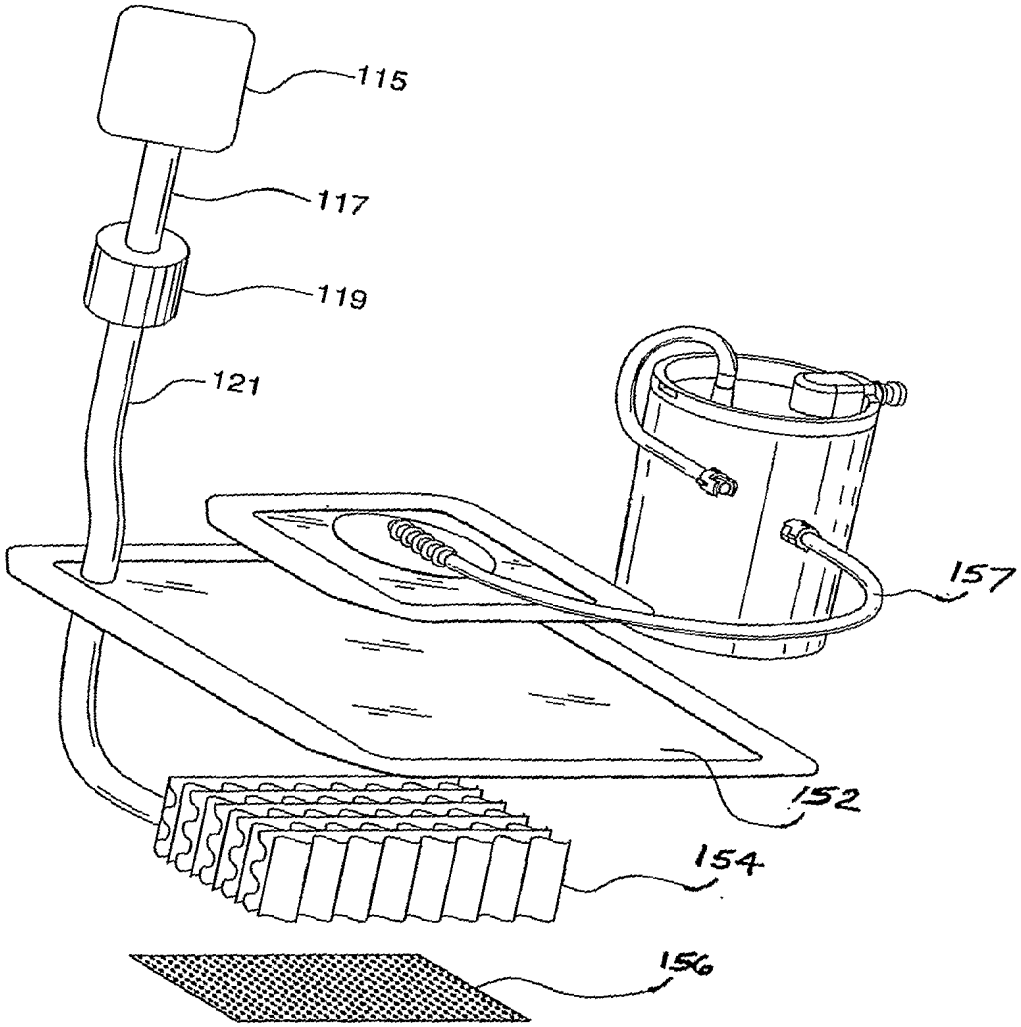


FIG. 8

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(54) Title: PUMP SYSTEM FOR NEGATIVE PRESSURE WOUND THERAPY

(57) Abstract: A pump system for applying negative pressure to a wound, including a flow monitor capable of detecting a deviation from a reference airflow rate provided by a controlled leak to determine whether the system is operating normally or abnormally, and a flow status annunciator to indicate a normal operating condition or whether an abnormal condition is a leak or an occluded line in the system. The pump system further includes a pressure controller for regulating operation of a pump to control pressure in the system at a range around a user-selected setpoint. The pump system may also include a waste collector and a level sensor for detecting when the collector is full.

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PUMP SYSTEM FOR NEGATIVE PRESSURE WOUND THERAPY

Reference to Related Applications

[0001] This application is a continuation in part of U.S. Patent Application No. 11/268,212 which was filed on November 7, 2005 and which claims priority of U.S. Provisional Application No. 60/699,218, filed July 14, 2005. This application also claims priority of U.S. Provisional Application No. 60/792,187 filed April 14, 2006, and of U.S. Provisional Application No. 60/847,221, filed September 26, 2006.

Field of the Invention

[0002] The invention relates to the general field of wound treatment, and to the more specific field of devices for wound drainage and treatment with suction.

Background of the Invention

[0003] It is well known to treat wounds by applying suction under airtight wound covers. The suction can be used to aspirate wound exudate and other liquids from the wound and/or the wound packing materials, and the suction can be applied as a healing modality for its well known antiseptic and tissue regeneration effects.

[0004] A primary concern in using suction assisted wound therapy is maintaining consistent suction pressure at the wound. It is increasingly recognized that once suction wound dressings are applied, the suction should be maintained at certain levels. Loss of suction to the wound can result if leaks or blockages occur in the system.

[0005] Leaks can occur through breach of the airtight seals surrounding the wound. The earliest devices merely ran a tube under the edge of a wound cover and applied an adhesive or paste around the tube and cover to maintain an airtight seal. The other end of the tube was connectable to a waste collection reservoir and suction regulator of a hospital suction system, and the pressure selected at the regulator was assumed to be the approximate pressure communicated to the wound area under the cover. The test for leakage was visual observance of the cover contracting and the absence of whistling noise when negative pressure was applied. See, e.g., M. E. Chariker, et al, "Effective Management of Incisional and Cutaneous Fistulae with Closed Suction Wound Drainage", *Contemporary Surgery,*

vol. 34, June 1989, pages 59-63. This initial check for an airtight seal did not, however, provide any warning if the system developed a leak or if blockage occurred in the collection circuit after hours of use.

[0006] The adhesive seal around the suction tube or other tubes which run under the edge of the wound cover in these prior wound dressings is vulnerable to cracking and breaching the airtight seal, creating air leakage into the cover. Improvements have been made to suction wound therapy devices to reduce the likelihood of leakage. For example, U.S. Patent Application No. 11/181,128, filed July 14, 2005 and commonly assigned with this application, discloses a tube attachment patch to allow the suction tube to be terminated outside of the primary cover and thus reduce the risk of breaking the adhesive seal to the skin. While these newer tube attachment devices provide more seal integrity, there is still the potential for breach of the airtight seals due to external causes such as patient movement in bed.

[0007] Blockage of suction to the wound can occur for several reasons. A waste collector for wound exudate is usually positioned somewhere in the suction line between the wound and the suction source. Waste collectors incorporate shut-off mechanisms that will shut off suction to the wound when the collector is overfilled. Another potential blockage is kinking or crimping of the suction line itself. Other potential blockage causes may be debris from the wound, clotting, or drying of wound exudates (particularly where the volume of wound exudates is small relative to the reference airflow). The suction source may also be inadvertently turned off, a line may be inadvertently clamped, or the suction regulator may be misadjusted after the dressing is applied. Since suction wound dressings are intended to last for long periods without changing, usually 24 hours or greater, a leak or blockage could develop unnoticed and not be detected for a duration sufficient to negate the beneficial healing effect of suction as well as increase the risk of infection. There are currently devices to sense when a waste collector canister is filled and provide a warning signal to empty it. None of the devices, however, provides a comprehensive and reliable monitoring of system operation, nor cover the full range of fault possibilities with leakage or blockage.

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[0008] In their efforts to improve over these prior art devices, the present inventors designed a suction wound dressing monitoring system as described in U.S. Patent Application No. 11/268,212. In doing so, they consider the impracticality of locating expensive pressure transducers in any of the system components that should be single-use disposable items due to contamination by body fluids. The designers considered that the same basic system should preferably be effective in detecting and indicating both leaks and system blockage, and that the detection of leaks or blockage should preferably be effective regardless where the leak or blockage occurs in the system. They considered that the system should preferably provide clear visual indication of both normal and abnormal operation, and could usefully provide aural indication and auto-recording of abnormalities. They also considered that the suction monitoring capability should be easily convertible from use with a stationary suction system, as typically found in hospital care rooms, to use with a portable suction pump.

[0009] The inventors considered that particularly when using a stationary suction source, it would be advantageous for the monitoring system to include an air dryer or dehumidifier to remove moisture from the air suctioned from the wound. Often, the air within the system is saturated with moisture (i.e., 100% relative humidity) such that formation of water droplets due to condensation is common and likely. However, such water droplets can potentially interfere with the proper functioning of a flow monitor in the system, and may further increase the likelihood of contamination in the system. Accordingly, a dehumidifier to reduce the humidity of the air would prevent the formation of water droplets and improve the functioning of the system and help to prevent contamination.

[0010] Conversely, the inventors considered that at other times, the system is not saturated and drying of wound exudates may occur in the system conduit, causing or aggravating blockages. Therefore, in some circumstances, it may be advantageous to humidify the air being suctioned from the wound.

[0011] In addition, the inventors have considered that when using a portable pump as the suction source it would be advantageous to use an electronic flow monitor in the monitoring system to detect deviation from a reference airflow and to provide

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corresponding indicators and/or alarms. An embodiment of the electronic flow monitor could be a microprocessor that is further capable of other useful functions, such as recording and accumulating various parameters in time units and providing reports of such time records.

[0012] For safety and redundancy, the inventors considered that it would be advantageous to provide the pump with a pressure controller that is independent of the flow monitor such that the pump can control pressure to a user-selected pressure setpoint without the need to receive or rely on a signal from the flow monitor. However, the pressure controller could provide to the flow monitor data related to pump operation, such as the detection of a faulty pressure transducer or a runaway pump condition. Moreover, a signal from the flow monitor could be used to periodically or temporarily reset the pressure setpoint for the pressure controller to a second pressure lower or higher than the selected pressure, such as for intermittent operation or to create a line clearing pressure pulse if a fluid flow deviation begins to indicate a conduit occlusion.

[0013] The inventors considered that it would be useful for the flow monitor to be coupled to an annunciator on the pump unit, the annunciator including visual and/or auditory indicators, for convenient indication of status conditions related to fluid flow, such as: normal operation, low level leak, high level leak, line occlusion, and filled waste collector, as well as an indication of patient compliant use. They also considered that it would be useful for the pump to have a separate error indicator for convenient indication of error conditions that are not related to fluid flow such as overpressure detection by the pressure transducer, pressure transducer failure, waste collector canister not attached, low battery voltage, attachment of incorrect power supply, low operating time remaining, collection canister full, and pump motor not operational.

[0014] Although the waste collector could be located anywhere between the wound dressing and the vacuum source, the inventors considered that when using a portable pump vacuum source, it would be advantageous for the pump unit to provide a docking station for the waste collector, such that the collector canister can be securely attached to the pump unit. In that configuration, the pump unit may also include a level detector for detecting and indicating the fill status of the waste collector. For example, the pump unit may have a

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level sensor, such as a capacitance sensor, to detect a filled waste collector based upon indications other than pressure differential across a hydrophobic membrane in the collector. If so, the level detector signal may be moderated by an algorithm in the flow monitor to reduce the likelihood of false indications of a full collector caused by sloshing when the pump unit with the waste collector is moved.

Brief Summary of the Invention

[0015] The invention provides a wound treatment system for applying negative pressure or suction therapy to a wound. A reference airflow rate is used for monitoring system operation. The negative pressure wound treatment system includes an airtight wound dressing and a suction conduit having one end operatively associated with the wound dressing to communicate suction to the wound and an opposite end operatively connected with a source of suction. The system preferably includes a waste collector disposed in the suction conduit between the wound dressing and the source of suction for collecting fluids aspirated from the wound. The waste collector may have a residual suction capacity to draw fluid through the conduit when the suction source is shut down. The invention provides a reference airflow rate (or "controlled leak") to the suction source when the system is in operation, such that deviation from the reference airflow can be detected as an indication of a change in operation.

[0016] In a preferred embodiment of the invention, a portable pump unit is used as the suction source. The pump unit has a flow monitor to monitor airflow through the conduit from the wound dressing to the pump as indicative of the level of negative pressure applied to the wound. Deviation from the reference airflow rate can be used as an indication of an abnormal condition such as leakage of the wound dressing or occlusion in the conduit. The flow monitor may be controlled by a microprocessor or by solid state circuitry capable of also providing additional functions including indicating system status and system errors, and further tracking and reporting time histories of system operation. To compensate for variations in the pump volumetric efficiency at a selected setpoint pressure, the flow monitor can have a look-up table to correlate between measured and actual flow rates for a range of negative pressures.

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[0017] For safety and redundancy, the pump unit has a pressure transducer and a pressure controller that can operate independently from the flow monitor. The pressure controller may use solid state circuitry or may be controlled by a microprocessor or may be a simple mechanical-type device. A user-operable pressure selector enables a user to select a negative pressure pump output within a range of negative pressure setpoints. The pressure controller controls the operation of the pump to maintain the pressure sensed by the pressure transducer between upper and lower limits around the selected setpoint pressure.

[0018] The flow monitor provides signals to an annunciator including a flow indicator, preferably a bar meter that is color coded and gradated to provide a visual indication of fluid flow through the pump, and hence through the system conduit. The annunciator indicates when the air flow through the pump is within a range of the reference airflow that is associated with normal system operation, and conversely indicates when a deviation from the reference airflow is associated with an abnormal operation. Compliant time (i.e., the time during which system operation is normal) is accumulated so that the caregiver can make reasonable assessments as to the effectiveness of the therapy.

[0019] The pump also includes an error detector and an error indicator for displaying a visual warning of system errors that are not associated with a deviation of the flow rate through the pump from the reference airflow. Such errors may include overpressure detection by the pressure transducer, pressure transducer failure, waste collector canister not attached, low battery voltage, attachment of incorrect power supply, low operating time remaining, collection canister full, and pump motor not operational. The error detector and error indicator are preferably controlled by a microprocessor or by solid state circuitry, although other mechanisms may be used to control error detection and indication.

[0020] Although the pressure controller may operate independently to maintain the setpoint pressure, a therapy timing controller or the flow monitor can be used to reset the pressure setpoint. For example, the therapy timing controller may periodically reset the pressure setpoint between a higher selected pressure and a second lower pressure when intermittent pressure therapy is desired. For another example, the flow monitor may temporarily increase the setpoint pressure when a deviation from the reference airflow rate begins to indicate an occlusion, such that pressure controller causes the pump to start or to

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increase in speed, creating a vacuum pressure pulse capable of clearing the conduit between the wound dressing and the waste collector.

[0021] The pump may also include a timing subsystem to record and accumulate the time units based upon inputs from other sensors, and to provide reports of the time units that the pump is running. The reports may include a record of runtime intervals, a record of the date and duration of runtime intervals, a record of total accumulated runtime, a record of accumulated compliant runtime, and a record of runtime remaining on a preset runtime period.

[0022] Various waste collectors may be constructed for collecting wound exudates under negative pressure conditions, including, for example, a flexible bag having an internal support. A preferred waste collector is a disposable upright cylindrical transparent plastic canister with fill level markings on an outside surface. The waste collector canister may be prevented from overfilling by a hydrophobic membrane filter at the top of the canister that shuts off the air flow when the canister is full. The liquids aspirated from the wound may be turned into a gel, for ease of disposal and to prevent spilling, by a gelling agent in the disposable canister. To keep the waste in the canister level, the gelling agent is preferably provided in stacked disks. The waste collector has an inlet connector for a suction tube coming from the wound dressing, and an outlet connector for connecting to a portable pump, a dehumidifier, or a flow monitor. The outlet connector is preferably a proprietary (non-standard) connector that will not connect directly to the standard appliance fitting of a stationary suction system, to prevent the wound from being subjected to excessive suction if the conduit were to be mistakenly connecting directly to the suction system without pressure regulation.

[0023] The pump unit may provide a docking station for the waste collector, such that the collector can be securely attached to the pump. The pump unit preferably has a docking station with a profile conforming to an outer surface of the waste collector and a releasable latch fitting adapted to receive the outlet connector of the waste collector.

[0024] The pump unit may have a sensor proximate to the collector docking station for detecting the level of waste in the canister, the level sensor preferably being a capacitance

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detector. The flow monitor is capable of receiving a signal from the level sensor indicating a full collector canister, and the flow monitor may include an algorithm to be applied to the signal to reduce the likelihood of an erroneous indication of a full canister caused by liquid sloshing inside the canister.

[0025] The negative pressure wound therapy system may include a dryer or dehumidifier disposed in the conduit between the waste collector and the suction source, and preferably between the waste collector and the flow monitor, for reducing the tendency of condensate droplets to form in the system.

[0026] Some applications may necessitate adding moisture to the wound for therapeutic purposes, to maintain a clear collection conduit, or to prevent drying of wound exudates within the conduit. Moisture in the form of humidity and/or a liquid may be added to the wound via a separate conduit or directly into a calibrated vent.

[0027] The pump is preferably a portable battery-powered positive displacement pump in which flow rate is approximately proportional to pump speed, such that the flow rate of the system can be detected indirectly by measuring the motor speed or pump speed. A pressure transducer combined with an algorithm or look-up table may be used to correct motor and pump speed to flow for compressibility effect. Thus a motor speed indicator or tachometer may be the preferred monitoring instrument to provide input to the flow monitor. However, other flow rate monitoring instruments could be used, including but not limited to target meters, rotometers, turbine meters, mass flow meters, differential pressure cells, and hot wire anemometers.

[0028] The pump unit may have an activated charcoal air filter disposed at an air discharge port of the pump for reducing odors emanating from the pump. The filter may also include a desiccant. The pump may utilize a controlled backpressure to lessen the noise inherent in the operation of the check valves in a positive displacement pump, such as a leaf spring sound damper disposed over the pump outlet.

[0029] In a preferred embodiment, a calibrated vent in the suction conduit or tube near the wound dressing establishes the reference airflow by effectively providing a controlled leak rate. The calibrated vent may include, but is not limited to, an orifice, a needle valve,

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or a sintered porous element. Preferably the vent is located in the tube just outside of the wound cover. The vent may be an aperture in the tube sealed with a porous material having specific flow rate characteristics. The reference airflow rate may be in a preferred range of 50-300 cubic centimeters per minute (cc/min). Higher flows such as 1000 cc/min are possible, but practical limitations on the capacity of the suction source and line losses inherent in small diameter tubing, as well as the ability to detect the typical magnitude of a leak in the wound dressing, suggest that is preferable to use a flow below 1000 cc/min.

[0030] By locating the vent in the conduit close to the wound dressing, the reference airflow also serves to purge the conduit of fluids and other wound exudates. The purging effect minimizes the likelihood of reflux of contaminated fluid back into the wound, and the risk of infection attendant to such reflux. Since the fluid does not reside in the conduit for an extended time, the purge effect also reduces the likelihood of blood clotting in the line. The pump system may also provide a pressure pulse generator to clear the collection line of serial slugs of fluid if a reduction in flow is detected.

[0031] Although the term "airflow" is used herein for consistency, it should be apparent that it is not limited to the composition of ambient air. It is common in medical settings to alter the composition of airflow to a wound, such as by increased oxygen or therapeutic aerosols or other beneficial medications. It is also understood that in addition to air, the suction source will draw wound exudates and bodily fluids through the suction conduit. The flow of any of these mixed gases or aerosol suspensions, any of which may include wound exudates, should be considered airflow for purpose of this description. The term "fluid flow" is sometimes used interchangeably with "airflow" to more generally indicate a flow of air, possibly including liquid exudates, in the system.

[0032] These and other advantages and aspects of the invention will become apparent upon reading the detailed description and drawings that follow.

Brief Description of the Drawings

[0033] Figure 1 is an exploded prospective view of an embodiment of a system for negative pressure wound therapy.

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[0034] Figure 2 is a perspective view of a suction tube attachment device showing an air vent in the suction tube to create a controlled reference airflow rate to the suction source.

[0035] Figure 3 is a cross-sectional view of a waste collector of Figure 1, taken through section 3-3, showing the shutoff membrane and gel agents.

[0036] Figure 4 is a cross-sectional view of a flow monitor of Figure 1, taken through section 4-4.

[0037] Figure 5A is an enlarged perspective view of a preferred embodiment of a system for negative pressure wound therapy using a portable suction pump.

[0038] Figure 5B is a prospective view of the top front of a portable pump unit that may be used in the system of Figure 5A.

[0039] Figure 6 is a control schematic diagram corresponding to an embodiment of a pump unit.

[0040] Figure 7 is a schematic view of an alternate flow monitor using a target meter.

[0041] Figure 8 is an exploded perspective view of a portion of an alternate embodiment of a system for negative pressure wound therapy including therapeutic fluid delivery to the wound.

[0042] Figure 9 is an exploded perspective view of an embodiment of a system for negative pressure wound therapy including a dehumidifier.

[0043] Figure 10 is a schematic cross-sectional view of the dehumidifier of the system of Figure 9.

[0044] Figure 11A is a front view of the dehumidifier.

[0045] Figure 11B is a cross-sectional view of the dehumidifier of Figure 11A taken through section 11B-11B.

[0046] Figure 11C is a top view of the dehumidifier of Figure 11A.

Detailed Description of the Invention

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[0047] Figure 1 shows an embodiment of a system (10) for negative pressure (suction) wound therapy. The system (10) includes a wound dressing (12), a flow monitoring device (18), and a suction regulator (20) for regulating vacuum from a stationary suction source. Figure 5A shows an alternate embodiment of a system (10) for negative pressure wound therapy where a portable suction pump unit (102) is used in place of the suction regulator (20) and the stationary suction source.

Wound Dressing

[0048] The wound dressing (12) typically includes a primary wound cover (22) and wound packing material (24), and may include a special wound contact layer (26). A suction tube (14) communicates with the wound packing material (24) by running under the edge of the wound cover (22), by extending through the wound cover (22), or by terminating outside of the wound cover (22) and communicating with a nozzle or slot in the wound cover (22). Various wound dressings (12) may be used comprising a wide variety of wound covers (22), wound packing materials (24), optional wound contact layers (26), and means for communicating the suction tube (14) with the packing material (24). The wound dressing (12) shown in the drawings and described herein uses presently preferred components, but the invention is generally applicable to any wound dressing subsystem (12) and is not intended to be limited to any particular components.

[0049] The primary wound cover (22) is preferably an airtight wound cover that is vapor permeable. The term "airtight" means that the material is sufficiently occlusive to resist airflow through the cover to maintain suction under the cover while suction is being applied. It is preferred to use a thin film transparent commercial bandage, such as medical grade Tegaderm™ manufactured by 3M, that is impermeable to liquids but permeable to water vapor and oxygen. There are many other thin-film commercial bandages that have similar properties. Highly impermeable materials could also be used. However, since it is beneficial in wound therapy to allow water vapor to escape and oxygen to migrate into the wound, semi-permeable covers of film material such as Tegaderm™ are preferred. In some instances, the primary wound cover (22) could also be a rigid or semi-rigid enclosure placed over the wound. The primary wound cover (22) is generally sealed to the skin surrounding the wound with an adhesive (not shown) incorporated in the wound cover (22), and gap filler paste (not shown) may be used where needed.

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[0050] Before the wound cover (22) is applied, the wound is generally packed with a wound packing (24). The wound packing (24) may include simple gauze or foam pads or other materials commercially sold as wound packings. The presently preferred wound packing (24) is polyester fibers or comparable resilient fibers in a corrugated layer pattern configured to form a resilient compressible structure, as described in U.S. Patent Application No. 10/981,119, commonly assigned with this application.

[0051] The wound packing (24) may also be attached to a wound contact layer (26). The presently preferred wound contact layer (26) has a special construction that provides a wound contact surface, with depressions formed into the surface, to work in conjunction with the suction to encourage more rapid tissue regeneration, as described in U.S. Patent Application No. 10/982,346, commonly assigned with this application. The contact surface is configured such that voids formed by the depressions remain above the wound surface in the presence of moisture, compressive forces, and suction, thus encouraging local tissue deflection.

[0052] The wound dressing (12) has a suction tube (14) attached to the wound cover (22), as shown in Figure 2. The wound dressing (12) may have one or more other tubes (28) for medication supply or wound flushing. The tube(s) (14, 28) may pass through the wound cover (22) or under the edge thereof, but a presently preferred arrangement uses a tube attachment patch (30) to allow the suction tube (14) to be terminated outside of the primary wound cover (12) to reduce the risk of breaking the adhesive seal to the skin, as described in U.S. Patent Application No. 11/181,128, commonly assigned with this application.

[0053] A distal end of the suction tube (14) in this embodiment has a vent hole (32) that is sealed with a porous plug (34). The porous plug (34) provides a controlled leak, or reference airflow, for flow monitoring devices described hereafter, including the flow monitoring device (18). The vent (32, 34) should be located outside the primary wound cover (22) but is preferably located as close to the wound cover (22) as possible. An advantage of having the suction tube (14) connected to the tube attachment patch (30) outside of the wound cover (22) is that controlled leak reference airflow may be used without drying out the wound, as might occur if the suction tube (14) passed under the

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wound cover (22) near the wound. While it is feasible to route the suction tube (14) under the wound cover (22) while the controlled leak vent (32, 34) is outside of the actual wound space, it would be important to avoid excessive drying of the wound tissue due to the introduced airflow. In addition, it is possible with the type of tube attachment patch (30) shown in Figure 2 and described in U.S. Patent Application No. 11/181,128 to provide the porous vent (32, 34) as an aperture in the patch (30).

[0054] A wound therapist applies the wound dressing (12) to the patient and attaches the system to suction. The therapist remedies leaks in the dressing by smoothing out creases or wrinkles in the wound cover and addressing gaps due to folds in the patient's anatomy. It has at times been useful to address specific areas of difficult anatomy by using a gap filling paste, as is common in ostomy care, such as moldable strip paste from Coloplast. The airflow monitoring instruments described hereafter facilitate the initial dressing set up process by providing active feedback to the therapist on the integrity of the seal around the wound dressing and tubes.

Waste Collector

[0055] Since a primary function of negative pressure or suction therapy is to drain liquids from the wound, a system (10) normally includes a waste collector (16) for collecting fluids aspirated from the wound. As shown in the embodiment of Figure 1, the air passage through the collector or container (16) forms a part of a suction conduit between the wound and the suction source. As shown in cross-section in Figure 3, the collector (16) may be an upright canister (36) with a right circular cylinder profile. The canister (36) is preferably made of a transparent or semi-transparent material such as plastic that enables viewing of the level of liquid contained therein. The canister (36) may have fill level markings in a band extending vertically along the outside of the canister. The markings may be on a paper label adhesively glued to the canister (36) or may be marked, embossed, or etched directly onto the canister (36). The fill level markings may also be created on the pump unit (102). The canister (36) is preferably a disposable, single-use device. The canister (36) has a lid (38) incorporating a fitting (40) passing through the lid (38) for the attachment of an inlet tube (42). The inlet tube (42) may be an end of the suction tube (14) leading from the wound or a short section of tube that terminates with a connector fitting (44) for mating with a matching connector fitting (46) on the end of the suction tube (14).

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[0056] Airflow and any blood or other fluid aspirated from the wound passes through the fitting (40) in the lid and into the canister (36). The liquid is retained in the canister (36), while the air rises and is drawn through a hydrophobic membrane (50) sealed to the inside of the lid (38). The upstream side of the membrane (50) interfaces with the interior of the canister (36) and the downstream side of the membrane (50) interfaces with an outlet air channel (52). The membrane (50) acts as a bacteria filter. Because the membrane (50) is hydrophobic, it can be used as a shut off mechanism to prevent the canister (36) from overflowing and to prevent contamination from flowing out of the collector (16) toward the suction source. If the canister (36) is allowed to fill high enough for the contents to contact the membrane (50), the membrane (50) occludes and blocks airflow from passing through the collector (16). Blockage of the membrane (50) prevents suctioning more waste from the wound, and as described hereafter, the blockage of reference airflow is detected as an indication of an abnormal operating condition. In other embodiments described hereafter, the level of waste product in the canister (36) can be detected by a capacitance sensor or other detector on the pump unit (102), and the detection used to prevent overfill of the canister (36).

[0057] The lid (38) defines the outlet air channel (52) extending from the downstream side of the membrane (50) to a connector (54) for connecting the collector (16) to the portable pump unit (102) or to a tube (58) running to a stationary wall suction system. However, the connector (54) is preferably a proprietary (non-standard) connector that will not connect directly to the standard appliance fitting of a stationary suction system, in order to prevent the collector (16) from being mistakenly connected directly to the suction system without the flow monitoring device (18) and pressure release features described hereafter; connecting the collector (16) directly to a suction system could risk applying too great a suction to the wound. The mating receptacle in the portable pump configuration described hereafter is configured to receive the proprietary connector. The connector (54) includes a sealing element such as an o-ring seal. This arrangement provides that a fresh o-ring is preferably used with each disposable collector (16), as contrasted with other pump connectors where the sealing element is in the pump and will ultimately wear out and cause the system to fail because of leakage.

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[0058] Preferably the liquid waste sucked from the wound is turned into a gel for ease of disposal and to prevent spilling or splashing. Although the gelling agent could be provided in porous bags, it is preferred to use disks (56) of laminated fiber sheets containing a gelling agent, such as provided by Gelok International. The disks (56) are cut to fit inside of the canister (36) and are stacked on top of each other. The stacked disks (56) cause the liquid to turn to a level surface gel in the canister (36).

Controlled Reference Airflow

[0059] Some prior art negative pressure wound therapy systems do not monitor the flow of fluid (air and effluents) being suctioned from the wound dressing (12), while others do so less than optimally by trying to directly sense pressures at the wound. In contrast, the system described herein uses a reference airflow, as may be provided by a calibrated orifice, valve, or filter or by the controlled leak air vent (32, 34), to indicate whether the system is in normal or abnormal operation. The porous plug (34) is calibrated to provide a known reference airflow or controlled leak. A flow rate at or near the reference airflow indicates normal operation, while a flow rate that deviates appreciably (either higher or lower) from the reference airflow indicates abnormal operation. A flow rate higher than the reference airflow indicates leakage, while a flow rate lower than the reference airflow indicates blockage or occlusion or a full waste collector (16).

[0060] The reference airflow rate from the calibrated vent (32, 34) is used for monitoring fluid flow and thus for assessing overall system operation. The controlled leak rate should be low to maintain a proper suction at the wound site and a moist healing environment. Preferably the reference airflow is in the range of 50-300 cubic centimeters per minute (cc/min). More preferably, the reference airflow is approximately 100 cc/min. A flow of 50-300 cc/min is low enough to minimize drying and does not significantly alter the suction applied at the wound. Additionally, the flow is low enough to minimize the use of battery power where a portable pump is used as the suction source. A flow of this magnitude is readily obtained by providing a vent hole (32) in the suction tube that is sealed sterile with a porous plug (34). A suitable seal material for the porous plug (34) is a porous plastic manufactured by Porex from sintered high density polyethylene. Such porous materials are routinely employed to admit air into medical fluid lines at a sufficient flow rate to maintain an efficient sterile filtration barrier against microbes.

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[0061] An advantage of providing the reference airflow is that the tube (14) between the wound packing (12) and the waste collector (16) remains relatively clear of fluids since the continuous flow will encourage rapid movement of a plug of fluid from the wound packing (13) to the collector (16). Liquid aspirated from a wound may contain sufficient blood materials that it could be prone to clotting in a collection tube, lumen, or conduit if allowed to sit in a stationary condition for a period of time, and a clot in a collection line would result in loss of suction being applied to the wound. The reference airflow eliminates this potential problem. Typically, it is expected that the tube (14) could be cleared by the reference airflow in less than ten seconds, depending on the distance.

[0062] The range of flows suitable for a reference airflow rate are bounded at the lower end by the permeability of the wound cover (22) and at the upper end by the suction capacity of the suction source or pump. When the wound cover (22) is a semi-permeable material, there will be a natural low level background airflow from air molecules passing through the wound cover (22). This permeation airflow could serve as the reference airflow if the flow monitoring instrument were very sensitive. However, the permeation flow is usually too low and too erratic to be a good reference. Variations in the area of the cover and the possibility of the cover being obstructed by drapes and fluid from the wound can cause the permeation flow to be erratic. Thus, a calibrated vent, such as the porous vent (32, 34) is a preferred reference because it provides a larger and more stable flow rate that masks variations in the permeation flow. For example, Tegaderm® bandage will allow a diffusion of water on the order of 800 grams per square meter per day, which correlates to a flow rate of about 0.5 cc/min over a square meter. Typical wound cover area would be less than a tenth of a square meter, so in approximate terms, the semi-permeable material contributes 0.05 cc/min, or less than 0.1% of a reference airflow of 50 cc/min. Thus, any variation in the background permeation flow is masked by the larger reference airflow.

Flow Monitoring Device for Use with Stationary Suction Source

[0063] At least two embodiments of the flow monitoring device (18) may be used: a gradated mechanical indicating float meter (19) as shown in detail in Figure 4 and an electronic non-numerical indicator (232) as shown in detail in Figure 5B. The float meter (19) would preferably be used in conjunction with a stationary suction source (20) while the non-numerical indicator (232) would preferably be used with a portable pump unit (102)

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having a flow monitor (206). Other types of flow monitoring and indicating devices, such as target meters or hot wire anemometers could also be used.

[0064] In the system (10) of Figure 1, the flow monitoring device (18) comprises a float flow meter (19) that includes a suction conduit (58) interconnecting between the waste collector (16) and the stationary suction source. One end of the conduit (58) includes a mating connector (60) adapted to receive a proprietary connector (54) on the collector (16). The flow monitoring device (18) is preferably located at the opposed end of the conduit (58) from the collector (16) and attaches directly to an appliance connection fitting (64) associated with the adjustable suction regulator (20) as commonly found on stationary suction systems.

[0065] The flow meter (19) provides a visual indication of the flow rate through the system (10). During normal operation, once the flow rate has stabilized following an initial application of suction, the flow meter (19) provides a visual indication corresponding to the reference airflow rate. As long as the flow meter (19) maintains a visual indication of reference airflow rate, the system (10) is operating normally and is free of leaks or blockage, and hence the wound dressing (12) is subject to an acceptable level of suction. When the flow meter (19) provides a visual indication of a deviation to a higher air flow, the system (10) is operating abnormally because a higher air flow indicates leakage. The flow meter (19) may include one or more gradations of flow rates higher than reference airflow to indicate the magnitude of a leak. When the flow meter (19) provides a visual indication of a deviation to a lower air flow, the system (10) is operating abnormally because a lower air flow indicates occlusion or blockage in the system between the wound dressing (12) and the flow meter (19).

[0066] Figure 4 shows a cross-sectional view of the float meter (19). A standard connector (63) on the top end of the indicator attaches to a short conduit (62) connectable to the appliance fitting (64) of the adjustable suction regulator (20). At the bottom end of the flow indicator a standard connector (59) is attached to the suction conduit (58).

[0067] As shown in Figure 4, the flow meter (19) includes a clear tube (76) gradated into progressive sections (68, 70, 72, 74), each section having a different inside diameter.

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The narrowest section (68) is disposed at the bottom of the flow meter (19) and each successive section (70, 72, 74) moving upwards through the tube (76) is progressively larger in diameter. The gradated markings (not shown) indicate an airflow rate corresponding to various vertical locations along the tube (76). A float (78) is disposed within the tube (76) and serves as an indicator of flow rate through the flow meter (19) and thus through the system (10). Each section (68, 70, 72, 74) indicates a range of flow rates at which the float (78) will reside in that respective section.

[0068] The mass of the float (78) works in cooperation with the density (i.e., the pressure) of the flowing fluid and the clearance between the outside of the float (78) and the inside wall of the tube (76). It is typical to use suction in the range of 25-200 mm Hg in wound therapy. Accordingly, the flow monitoring device (18) incorporates a first flow restrictor (66) having an orifice (67) that is calibrated to restrict suction airflow to be less than 20 liters per minute when a controlled level of suction of 100 mm Hg is applied by the suction regulator (20). The density of the float (78) and the inside dimensions of the tube (76) are preferably calibrated for flow at a pressure of 100 mm Hg, although the indicated flow rates at different pressures are readily calculated. Additionally, the response of the float (78) to various flow rates and pressures through the same tube (76) can be changed by changing the density of the float (78).

[0069] The float (78) responds to airflow rate and will rise to a level where the dynamic forces are in equilibrium, balancing the upward force of the flow against the downward force of gravity. The gradated tube (76) is in contrast to typical flow indicators for other applications which have tubes with continuously increasing inner diameters. In those types of meters, slight changes in flow rate cause the float to chatter up and down around a height indicative of the flow rate. The use of discrete sections of uniform diameters, but increasing in progression, as the four sections (68, 70, 72, 74) in the tube (76) of the preferred flow indicator (19), reduces the chatter and causes the float (78) to move upward in stages. These stages are selected for discrete flows that provide easily interpreted reference information regarding the suction applied to the wound.

[0070] When there is no air flow, or an air flow rate less than the reference airflow, the float (78) rests at the bottom of the tube (76) in the lowest section (68). The lowest section

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(68) is preferably color-coded blue to indicate a blockage condition, such as a full collector (16) or an occlusion in the fluid path such as a blocked vacuum tube (14). When the flow into the flow meter (19) corresponds to the reference airflow, preferably between about 50 cc/min to about 300 cc/min, the clearance between the float (78) and the bottom section (68) of the tube (76) is such that the flow around the float (78) will cause the float (78) to rise into the next progressively wider section (70). Thus, normal reference airflow will cause the float (78) to rise a discernable amount into the next section (70). The section (70) of normal operation is color-coded green, indicating an acceptable condition.

[0071] When flow through the system (10) increases beyond an acceptable level due to a leak in the wound dressing (12), the clearance around the float in the normal position (70) may no longer be adequate to allow the float (70) to remain in this position, and the increased flow will lift the float (78) to a higher section in the tube (76) where the internal diameter is stepped up. The gradated labeling on the outside of the tube (76) provides a visual indication of the extent of the leak condition. The tube (76) includes at least one section (72) of increased diameter to indicate a leak condition and preferably includes two sections (72, 74) to indicate two levels of leak conditions, wherein the lower level leak condition section (72) is disposed immediately above the normal operation section (70), the section (72) having a larger diameter than the section (70), and the higher level leak condition section (74) is disposed immediately above the lower level leak condition section (72), the section (74) having a larger diameter than the section (72). The lower level leak condition section (72) is color-coded yellow, indicating a minor leak requiring repair. The higher level leak condition section (74) is color-coded red, indicating a major leak requiring immediate repair. The stepped up diameters require a significant change in flow before the float (78) will jump from one position to a higher one, thus eliminating the jumpiness that would be encountered with a continuous taper inner diameter as common in flow meters for other applications. Further, the stepped diameter sections (68, 70, 72, 74) reduce user interpretation, thus enhancing ease of use and safety. Additional stepped up diameter sections may be provided to indicate higher leak conditions or finer gradations in the level of leak.

[0072] The flow monitoring device (18) also incorporates a safety valve (80) that limits the maximum suction that may be applied through the system (10), guarding against the

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accidental application of excessively high levels of suction to the wound. It is typical to use suction in the range of 25-200 mm Hg for wound drainage and therapy. Accordingly, the suction limiting feature may preferably be set to limit the suction to no more than approximately 200 mm Hg. The safety valve (80) includes a suction pressure relief chamber (84) formed between the first flow restrictor (66) and a second flow restrictor (82) having an orifice (83). The orifice (83) is preferably about the same size as the orifice (67) in the first flow restrictor (66) to prevent the flow capability of the suction regulator (20) or the pump (103) from overpowering the relief capability of the safety valve (80). A resilient valve mechanism (86) in the relief chamber (84) serves as a release against the application of high levels of suction. The valve mechanism (86) is spring loaded to a predetermined suction setting, such as 200 mm Hg. If the suction pressure in the relief chamber (84) exceeds the predetermined setting, the valve mechanism (86) will open and allow vent air to be drawn into the system (10) from a relief port (69) to prevent excess suction from being applied to the patient's wound.

[0073] Protrusions (75) may be provided on the top underside of the interior of the float meter (19) adjacent to the first flow restriction orifice (67) to prevent the float (78) from completely blocking the orifice entry (67) to the pressure relief chamber (84), thus allowing the continued flow of fluid through the system (10) even if a major leak occurs. This allows continued communication of some suction to the wound even at high airflow rates. Alternatively, the protrusions could be located on the top surface of the float (78).

[0074] While the flow monitoring device (18) using a float meter (19) has been described in the context of a hospital wall suction system, it can also be used with suction pumps such as the portable pump unit (102), as is described below.

Dehumidifier

[0075] The negative pressure wound therapy system may include an air filter/dryer or dehumidifier (21) to protect the downstream components, and in particular the suction source, from potential contamination in the form of particulate matter, aerosols, and humidity. The dehumidifier (21) is preferably disposed in a system conduit between the waste collector (16) and the flow meter (19). Figure 9 illustrates an embodiment of the

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negative pressure wound therapy system including the air dryer or dehumidifier (21) conveniently integrated into a mount for the waste collector (16).

[0076] The dehumidifier (21) may include a particle filter (68) for removing airborne dust as may be encountered when the flow meter (19) is disconnected from the collector (16) for periodic changeover. Humid air exits the waste collector (16) after any liquids have been substantially removed from the wound exudates, but sufficient moisture may remain in the air such that the relative humidity is at or near 100%. At such a high relative humidity, any drop in temperature or pressure may cause condensate to drop out of the air. Accordingly, the dehumidifier (21) removes moisture from the humid air that could otherwise effect the calibration of the flow meter (19). A desiccant or other means of humidity control can be placed in the dehumidifier (21), as required.

[0077] The dehumidifier (21) may also operate by removing moisture from the humid air exiting the waste collector (16) by causing the humid air to pass across one side of a membrane (260) that is impermeable to air but is permeable to water vapor, and concomitantly causing ambient room air, at a relative humidity level much less than 100%, to pass across an opposite side of the membrane (260). Figure 10 schematically illustrates operation of the dehumidifier (21). Due to the properties of the air-impermeable, water vapor-permeable membrane (260), moisture from the higher humidity system air is transferred to the lower humidity room air. The lowered humidity of the system air exiting the dehumidifier (21), at a relative humidity below 100%, prevents the formation of condensation droplets in downstream components such as the flow meter (19) or the suction source.

[0078] The dryer or dehumidifier (21) includes two separate airflow paths (A) and (B) separated by the generally air-impermeable, water vapor-permeable membrane (260). Because the flow meter (19) is a precise device that indicates the quantity of system fluid flow, the dehumidifier is constructed so that the membrane (260) is air tight and air-impermeable such that air from the room side (B) cannot mix with air on the system side (A). At the same time, the membrane (260) should have good water transport properties to remove water from the system air. The membrane (260) is ideally a Dupont Nafion membrane with known water vapor transport properties, although other similar or

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equivalent membrane materials may be used. System air (a), having high humidity, flows from the waste collector (16) into a dehumidifier inlet (262). System air (a) flows across a surface (264) of the membrane (260) and then out a dehumidifier outlet (266) after passing through a particulate filter (268). System air then flows to the flow meter (19). Ambient air (b) enters the a dehumidifier inlet (270) and flows across a surface (272) of the membrane (260). Ambient air (b) exits a dehumidifier outlet (274) and is drawn into the suction source via a conduit (61).

[0079] System air (a) exiting the waste collector (16) is generally very humid (up to 100% relative humidity) due to the liquids that are being collected from the wound. Ambient air (b) is generally less humid; most hospital environments may have relative humidity in the 50% range, depending of course upon the prevailing outside temperature and weather conditions. The resultant moisture gradient across the membrane (260) causes water vapor (c) to be transported through the membrane (260) from the system air flowpath (A) to the ambient air flowpath (B), thus removing water vapor from the system air. As a result, the relative humidity of the system air is reduced to less than 100%, preventing condensation droplets from forming in the flow meter (19) and minimizing the chance that the flow meter (19) will malfunction due to water droplet formation.

[0080] Figures 11A, 11B, and 11C illustrate the dehumidifier (21) in more detail. In a preferred embodiment, as shown, the dehumidifier (21) also serves as a mount for the waste collector (16). The system air inlet (262) serves to accept the outlet connection fitting (54) of the collector (16), which may be secured to the dehumidifier (21) by a spring-loaded latch (280). A set of extending nubs (282) support the membrane (260) inside the dehumidifier (21) and provide flow channels for the system air to pass on the (A) side and position the membrane (260) to provide a flow passage for ambient air to pass on the (B) side.

Portable Pump Unit for Use as the Suction Source

[0081] The system (10) described herein may be used in conjunction with a stationary suction source as provided in most medical buildings, or may be used in conjunction with electrical power pumps to provide suction for wound therapy. However stationary suction sources, and even electric power pumps that may be moved from outlet to outlet, have

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limited portability. Accordingly, an embodiment of the system (100) provides a truly portable battery powered pump unit (102). In a portable pump embodiment (100) of the suction system, as shown in Figure 5A, the suction source is a portable suction pump unit (102) instead of a stationary suction source. Additionally, the use of an electronically controlled suction pump, for example by using a pump unit controller (200) as illustrated in Figure 6, provides the ability to incorporate further advanced control, monitoring, and alerting features into the negative pressure wound treatment system (100).

[0082] The pump unit (102) connects to the same patient circuit, including the wound dressing (12) and the waste collector (16), as described in regard to the negative pressure wound therapy system (10). The pump unit (102) preferably operates on low voltage DC power and has an onboard power source (222) such as a 12 volt battery. The pump unit (102) may also be adapted to be powered through a power cord from a standard AC power socket using a suitable AC/DC power converter (220), which may be combined with a battery charger to recharge the battery (222) during use. The pump unit (102) can receive DC power either from the converter (220), when plugged in, or from the battery (222), when used un-plugged.

[0083] The pump unit (102) is configured to produce controlled levels negative pressure. As shown in detail in Figure 5B and schematically in Figure 6, the pump unit (102) has a Mode Selector switch (204) to select between On, Off, and Intermittent control modes, and a pressure selector dial (206). A prescribed pressure setting is selected using the pressure selector dial (206). The available range of setpoints is preferably between about 30 mm Hg and 100 mm Hg, and is more preferably between about 30 mm Hg and 75 mm Hg. In one embodiment, discrete pressure setpoints of 20, 30, 40, 50, 60, 70, and 75 mm Hg are offered. Additionally, setpoint choices of 100, 125, 150, 175, and 200 mm Hg may be offered. The pump power may be placed into a On state, an Off state, or an Intermittent state using the Mode Selector switch (204). In the Off state, the pump unit (102) will not operate. In the On state, the pump unit (102) will operate based on the selected pressure setpoint. In the Intermittent state, the pump unit (102) will operate cyclically between a higher pressure setpoint selected by the selector dial (206) and a prescribed lower pressure setpoint, as will described in greater detail below.

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[0084] Referring to the schematic diagram of Figure 6, the portable pump unit (102) preferably includes a positive displacement air pump (103), a variable speed DC motor (104), a tachometer (212), a pressure transducer (208), a level sensor (214), a pump unit controller (200), and an annunciator (230). The pump unit controller (200) comprises a pressure controller (202), a flow monitor (210), an error detector (216), a therapy timing controller (224), and a timing subsystem (218). The annunciator (230) comprises a flow status indicator (232), an error indicator (234), a compliance indicator (236), and an audible alarm (238). The flow status indicator (232) is capable of indicating normal or abnormal flow conditions, and the error indicator (234) is capable of indicating other status, fault, or alarm conditions. In the depicted embodiment, the pump unit controller (200) may include one or more of a microprocessor, solid state electronic device, electromechanical devices, mechanical or pneumatic devices, or other equivalent control elements. If a microprocessor is used for performing functions including pressure control, flow monitoring, error detection, and status and alarm annunciation, a suitable processor is a Microchip 16 Series, part number 16F688, it being understood that other similar programmable logic devices could be used.

Vacuum Pressure Control

[0085] Referring to the embodiment schematically illustrated Figure 6, the pump unit controller (200) includes a vacuum or suction pressure controller (202) for maintaining a negative pressure in the wound. The pressure controller (202) is independent of the flow monitor (210), regardless whether the pressure controller (202) and/or flow monitor (210) use a microprocessor or an alternative means such as solid state control circuit. The pressure controller (202) regulates operation of the pump unit (102) based on a signal from a pressure transducer (208) that monitors the negative pressure produced at the suction side of pump (103). The pressure transducer (208) is preferably located in a conduit between the waste collector (16) and the pump (103). Alternatively, a low-cost pressure transducer (208) may be placed directly within the wound cavity and the signal from the transducer (208) conducted via wires to the pressure controller (202).

[0086] The pressure controller (202) receives a setpoint from the user positionable pressure selector dial (206). In an embodiment, the pressure controller (202) includes a solid state logic device and the selector dial (206) changes the resistance of a variable

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resistor to produce an electrical signal representing the selected pressure setpoint. The pressure controller (202) receives the selected pressure setting as an input, and sets an upper limit and a lower limit in a range above and below the selected pressure setpoint. The range between upper limit and the lower limit is selected to provide a reasonably stable suction level while minimizing the on-off cycling of the pump motor (104). A range of approximately 10 mm Hg is preferred to optimize patient comfort and to minimize noise. The pressure controller (202) will function to maintain the pressure sensed by the transducer (208) between the two limits defining the range about the pressure setpoint. Such control circuits are commonly employed in industrial applications as well as in hospital central suction systems.

[0087] When the pump unit (102) is initially turned On by the Mode Selector switch (204), the pressure controller (202) causes the pump motor (104) to start running, driving the positive displacement pump (103). The pump motor (104) continues to run until the pressure transducer (208) detects pressure at or exceeding the upper vacuum limit of the pressure range set by the pressure controller (202) in response to the pressure setpoint on the selector dial (206). The pressure controller (202) continually compares the pressure signal from the pressure transducer (208) to the setpoint limits bounding the range about the operator-selected pressure setpoint. Once the upper control limit is reached, the pressure controller (202) turns off the pump (103). Normal reference airflow in the system (10) will cause pressure at the transducer (208) to decay towards the lower limit of the control range. Once the detected pressure has reached the lower control limit, the pressure controller (202) will turn the pump (103) back on, and the process is repeated cyclically. Thus, the pressure transducer (208) senses the current negative pressure in the system (10) and the pressure controller (202) turns the pump (103) on and off accordingly to maintain negative pressures that are within the selected desired range.

[0088] The motor (104) is preferably a variable speed DC brushless motor. However other styles of DC motors are acceptable, as well as AC motors that can be equipped with variable outputs. When a variable speed motor is used, the speed is controlled via a pulse width modulation (PWM) feature of the pressure controller (202). Variable speed control allows for efficient use of DC power. When a constant speed motor is employed, the on/off time is varied such that the motor is cycled on and off at the most efficient operating speed.

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[0089] The positive displacement pump (103) preferably uses a diaphragm style pump with inlet and outlet check valves. The diaphragm pump crankshaft is operationally connected to the shaft of the variable speed motor (104). Other positive displacement pumps may be used, such as peristaltic, piston, lobe, syringe or rocking piston pumps.

[0090] The tachometer (212) can be used to indicate the rotational speed of the motor (104) or pump shaft. Within the generic term "tachometer" various forms of motor or pump speed sensors may be used. For example, Hall sensors and encoders are commonly employed on DC brushless motors to indicate motor RPM (revolutions per minute). It is also possible to sense back-EMF in brush versions of DC motors to determine motor shaft rotation speed. In an AC motor driven pump, an oscillating bar with a magnet mounted to an end may be excited by an AC coil, thus driving a diaphragm, and a count of the oscillations delivered by the coil can be used as an indicator of pump speed. Regardless the type of tachometer, such a tachometer can be used to infer or determine the flow rate of fluid displaced by the pump unit (102). Because there is a direct correlation between the speed of the positive displacement pump (103) and the actual volume of fluid displaced at a given operating pressure, a measurement of the pump speed combined with a measurement of pressure at inlet of the pump (103), as measured by the pressure transducer (208), can be used to calculate flow rate. Thus, measuring the speed of the positive displacement pump (103) is a surrogate for direct airflow measurement.

[0091] As described above, the pressure controller (202) will cause the pump (103) to run as necessary to maintain the level of vacuum pressure sensed by the transducer (208) within the desired range of the selected negative pressure setpoint. The pressure controller (202) may modulate the on-time duration of the pump (103) to maintain the negative pressure in the desired range. The on-time duration of the pump (103) can be increased or decreased as required by the pump controller (202) to achieve greater or lesser suction, respectively. When a variable speed motor (104) is used, the motor speed can also be adjusted by pulse width modulation, separately from or in combination with the on-time duration, to operate the motor (104) at an efficient speed. Accordingly, the pressure controller (202) can adjust either or both the on-time duration and pump speed to maintain the negative pressure in the range established by the selected pressure setpoint. Thus, the pressure controller (202) operates based on sensed pressure, and not on sensed air flow.

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This allows the pressure controller (202) to function independently from the mechanisms for detecting, monitoring, and displaying the status of flow in the system (10) that are embodied in the flow monitor (210) and the error detector (216).

Flow Monitor and Flow Status Indicator

[0092] As shown in Figure 6, the flow monitor (210) can be adapted to monitor pump activity (i.e., on-time duration and speed) as an indicator of the flow rate of air through the negative pressure wound therapy system (10). The flow monitor (210) is coupled with the flow status indicator (232) in the annunciator (230) to provide audible and visual indication of the status of operation of the system (10) by comparing the fluid flow rate to the reference airflow rate and annunciating indicators of normal or abnormal operation. The flow monitor (210) functions independently from the pressure controller (202). Preferably the flow monitor (210) receives input from sensors that detect pump motor activity, determines a flow rate based upon the motor activity sensor inputs, identifies deviations from the reference airflow rate, and provides a signal to the flow status indicator (232) identifying either a normal state of operation or one of at least two abnormal states of operation.

[0093] The flow monitor (210) is capable of performing flow monitoring functions necessary to compare the fluid flow rate to the reference airflow rate and determine normal or abnormal operational status. To monitor flow rate, revolutions of the motor (104) or positive displacement pump (103) are counted over a period of time, and the count, along with the pressure transducer (208) measurement, is provided as input to the flow monitor (210). An algorithm in the flow monitor (210) correlates the rate of motor revolutions (i.e., count per time), adjusted for pressure, to determine the volumetric flow rate of air passing through the pump (103). The flow monitor (210) compares the calculated flow rate to the known reference airflow rate to determine fault conditions.

[0094] The flow rate detected by the flow monitor (210) is converted into a signal that illuminates a display bar on the flow status indicator (232). A flow rate that is less than the reference airflow rate is displayed as abnormal operation on the flow status indicator (232), indicating an occlusion in the negative pressure system (10). Most commonly, a low flow rate condition is caused by a full waste collector (16), but other causes may include a

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pinched or blocked tube (14) or blockage of the controlled vent (32, 34). A user can distinguish between a full collector (16) condition and a blocked tube (14) condition by viewing the flow status indicator (232) in combination with the error indicator (234) to determine if the level sensor (214) has indicated a full collector (16), as will be discussed below. A flow rate that is comparable to the reference airflow rate is displayed as normal operation on the flow status indicator (232), indicating an acceptable flow rate. For purposes of determining normal operation, a range is established about the reference airflow rate, such that a flow within that range is deemed normal and a deviation upward or downward outside that range is deemed abnormal. A flow rate that is higher than the reference airflow rate is displayed as abnormal operation on the flow status indicator (232), indicating a leak in the negative pressure system (10). Preferably, two levels of leak condition are indicated, a low level leak and a high level leak, to provide a gradated alert to the caregiver indicating the urgency with which the seal of the wound cover (22) must be addressed.

[0095] Referring particularly to Figure 5B, a preferred flow status indicator (232) for use in conjunction with the flow monitor (210) comprises a color-coded bar display having four differently colored regions to indicate four different status conditions. In particular, the bar display preferably includes regions to indicate low flow, normal reference airflow, low-level leak, and high-level leak. In the depicted embodiment, the bar display includes a region of blue LEDs (240) to indicate a flow rate lower than the reference airflow rate range, a region of green LEDs (242) to indicate a flow rate within the reference airflow rate range, a region of yellow LEDs (244) to indicate a flow rate at a low level above the reference airflow rate range, and a region of red LEDs (246) to indicate a flow rate at a high level above the reference airflow rate range. It is readily apparent that a wide variety of non-numerical indicators may be used to display three, four, or more status conditions, including but not limited to an arrow translating up and down a linear scale with demarcated regions, an arrow rotating around a circular scale with demarcated regions, a series of lights such that the number of illuminated lights indicates the status condition, one or more blinking lights such that the frequency of blinking indicates the status condition, and illuminated symbols representative of said flow ranges. Additionally, an audible indicator or alarm (238) may be used to indicate an abnormal operating condition, separately from or

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in combination with a visual indicator. For example, a beeping or continuous tone may be used to indicate abnormal operation, with a different tone pitch, tone duration, or beeping frequency used to indicate each different abnormal condition, while a normal condition would be indicated by the absence of an alarm tone. An alarm silencer or alarm acknowledge button (239) is provided to silence the audible alarm (238) until the abnormal condition has been corrected.

[0096] The gradation of ranges of the flow status indicator (232) may be linear or non-linear and may be adjusted depending on the particular conditions in which the negative pressure wound treatment system is applied. In one embodiment, the reference airflow rate range is preferably defined as a ±10% band about the reference airflow rate, a low flow rate is defined as less than 90% of the reference airflow rate, a low-level leak flow rate is preferably defined as between 110% and 125% of the reference airflow rate, and a high-level leak flow rate is preferably defined as greater than 125% of the reference airflow rate. In another embodiment, where tighter flow rate control is desirable and possible, the reference airflow rate range is defined as a ±5% band about the reference airflow rate, a low flow rate is defined as less than 95% of the reference airflow rate, a low-level leak flow rate is defined as between 105% and 115% of the reference airflow rate, and a high-level leak flow rate is defined as greater than 115% of the reference airflow rate. Tighter flow control may be required, for example, where the wound being treated is smaller such that a low-level leak would be more likely to compromise the vacuum being applied to the wound dressing (12). In yet another embodiment, where less tight flow rate control is desirable and possible, the reference airflow rate range is defined as a ±15% band about the reference airflow rate, a low flow rate is defined as less than 85% of the reference airflow rate, a low-level leak flow rate is defined as between 115% and 130% of the reference airflow rate, and a high-level leak flow rate is defined as greater than 130% of the reference airflow rate. Less tight flow control may be desired, for example, where the wound being treated is larger such that a low-level leak would be less likely to compromise the vacuum being applied to the wound dressing (12). It is readily appreciated that each of the status condition ranges may be adjusted independently to optimize the characteristics of the flow status indicator (232) for a particular application.

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[0097] In the embodiment shown in Figure 6, when the pump (103) is independently turned on and off by the pressure controller (202) to maintain setpoint pressure, the pressure sensed by the transducer (208) will oscillate between the upper control limit and the lower control limit. The period of this oscillation is related to the reference airflow rate, the normal rate of permeation through the wound cover (22), and any leakage in the wound dressing (12). Because the reference airflow rate and the normal rate of permeation through the wound cover (22) should be relatively constant, the higher the leakage in the wound dressing (12), the shorter the period of oscillation will be. Thus, the time intervals between the pump turning on or off can be detected by the flow monitor (210) and used as a rough measure of fluid flow rate through the system.

[0098] Where the pump motor speed is also controlled via a pulse width modulation (PWM) control to make the use of DC power more efficient, the flow monitor (210) can also correlate the on/off intervals with pulse rate to determine flow rate. In normal operation, the positive displacement pump (103) will output a given number of pulses for each revolution of the pump. The pulse signals can be supplied as an input to the flow monitor (210). These pulse signals can be used to determine the number of pumping strokes the pump (103) has performed over a period of time, and combined with the known volume of each pump stroke, can provide very close approximation of the pumped volume per time (i.e., volumetric flow rate). The flow monitor (210) continually counts the pulses being output from the pump (103), combined with the pressure measured by the transducer (208), to calculate the volume of air flow. When taken in combination with a time measurement, pump pulses per unit time represent the airflow rate. In a presently preferred embodiment, the time measurement is based on the off cycles of the pump motor: from the time the pump (103) turns off, until the next time the pump turns off, the flow monitor (210) counts the pulses and divides by the time between each motor off condition to determine the flow rate through the negative pressure system (10).

[0099] As discussed previously, abnormal conditions in the suction therapy system are detected as deviations from the expected flow (i.e., the reference airflow rate) through the system. In yet another embodiment, the reference airflow rate range is calibrated to a tolerance within approximately 50-100 cc/min higher or lower than the airflow produced by the calibrated vent (32, 34) on the end of the suction tube (14). A flow rate within this

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range is denoted as normal operation. If the flow monitor (210) determines that the pump is not running at a normal duration to maintain the setpoint negative pressure, the flow status indicator (232) of the annunciator (230) provides a visual indicator and audible alarm to alert the caregiver. For a PWM controlled pump (103), an increase in the on-time of the motor (104) is proportional to increase of air flow in the system (10). The flow monitor (210) uses an algorithm to correct the air flow rate based on the actual pressure in the system (10). Any leak in the wound dressing (12) will require more flow to maintain the require suction level, such that the leak will be compensated for by an increase in the on-time of the pump (103). When the on-time increases to equate to a flow of approximately 3 liters per minute, the flow status indicator (232) provides a visual indicator to alert the caregiver to inspect and repair the leak in the wound dressing (12). If the caregiver is able to correct the leak, the visual indicator will turn off. If the fault condition is not addressed (by resealing the wound site) within a prescribed timeframe, preferably about one minute, the flow monitor (210) will cause the flow status indicator (232) to activate the audible alarm (238). Nevertheless, even when a leak condition exists, the pump (103) will continue to run as directed by the pressure controller (202), delivering some level of suction until the condition is corrected or the pump unit (102) is turned off.

[0100] The flow monitor (210) can also sense the loss or drop of flow below the reference airflow range. A drop in flow may be caused by various fault conditions, including the tubing (14) to the waste collector (16) becoming clogged with wound exudates, the tubing (14) being crimped shut by bending or squeezing, the waste collector (16) becoming full, and the filter (50) becoming occluded. These conditions also result in the loss of negative pressure at the wound. When a reduction in flow below the reference airflow range is sensed, and the flow status indicator (232) activates a visual indicator to alert the caregiver of a blockage condition.

Intermittent Suction Regime

[0101] It is sometimes desirable to provide suction in an intermittent fashion to benefit the healing process. Prior processes involve allowing the negative pressure system to vent to atmospheric pressure for a period of time to allow for reperfusion of tissue. However, allowing the system to completely vent to atmosphere results in a complete loss of suction on the wound dressing (12) and the resultant loss of any benefit that suction could play in

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maintaining an airtight seal around the wound. The present invention solves this problem by varying the suction between two distinct levels: a first higher vacuum level selected by the pressure selector dial (206) and a second reduced vacuum level of 20-25 mm Hg. The selected higher level is used to apply the beneficial therapeutic effects of suction. The second reduced level is below capillary bed pressure, so reperfusion of tissues will occur in this lower setting, while the wound dressing (12) maintains at least some level of suction to help keep the dressing seals in place and to maintain the reference airflow, thus preventing reflux (by ensuring continuous one-way flow) and clotting in the system tubing. With this type of intermittent pump operation, the reference airflow should be selected such that it is maintained even at the reduced level, or else any annunciator (230) outputs associated with low airflow should be disarmed by the flow monitor (210) during reduced suction intervals as well as the ramp-up and ramp-down intervals.

[0102] To effect intermittent suction, the pressure controller (202) can cyclically reset the pressure setpoint between the selected pressure and the second reduced pressure. When the Mode Selector switch (204) is set to Intermittent mode, the programming in the therapy timing controller (224) uses a time interval for switching the pressure setpoint provided to the pressure controller (202) back and forth between the selected pressure and the second reduced pressure. In an embodiment, to enter the reduced pressure cycle of the intermittent mode, the therapy timing controller (224) activates a transistor that adds a resistance to the pressure controller circuitry, effectively resetting the pressure setpoint to the second reduced pressure.

Waste Collector Docking Station and Fill Indicator

[0103] As illustrated in the embodiment of Figures 5A and 5B, the pump unit (102) includes a docking station (160) for supporting the waste collector (16) which collects liquids aspirated from the wound. The waste collector (16) is disposed in the system between the wound dressing (12) and the pump (103). The waste collector (16) preferably comprises a transparent plastic canister (36) having right circular cylinder profile and fill-level markings along the height of the cylinder. The inlet connection (40) of the waste collector (16) is interconnected to the tubing (14) extending from the wound dressing (12), and the outlet fitting (54) of the waste collector (16) has an o-ring seal. The portable pump docking station (160) supports the waste collector (16). The docking station (160) has a

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concave profile conforming to an external section of the collector (16) and a generally circular base (162) to support the waste collector (16) when docked. The pump unit (102) includes a releasable latch fitting (164) in an upper wall of the docking station (160) that is adapted to receive the connection fitting (54) of the waste collector (16). The fitting (54) is inserted into the latch fitting (164) and latched in place. The waste collector (16) may be released and removed from the docking station (160) by depressing the release button (166) to release the fitting (54) from the latch fitting (164).

[0104] The pump unit (102) provides the ability to detect a filled waste collector (16) without the need to measure differential pressures across the membrane (50), as is required in existing systems. Differential pressure measurement can be problematic because partially clogged membranes can lead to erroneous readings and interpretations. In a preferred embodiment, the pump unit (102) employs positive level detection as a direct indication of the fill status of the waste collector (16). In particular, the pump unit (102) may include a level sensor (214) proximate to the docking station (160) for detecting when the level of waste in the collector (16) equals or exceeds a level which indicates a filled collector condition. The level sensor (214) can take many forms, such as capacitance, optical, ultrasonic, contact wire, float, and others similar sensing mechanisms. A preferred level sensor (214) is a capacitance detector such as a Model# BC 10-QF5 sensor manufactured by Turck, Inc. The level sensor (214) can be positioned in the pump unit (102) at a desired level proximate to the docking station (160) and has the ability to read a change in capacitance as caused by the presence of an ionic fluid. A capacitance level sensor is capable of sensing capacitance through surfaces such as the wall of the canister (36), so no elements of the sensor (214) are exposed to the wound exudate. Capacitance type detection is also tolerant to conditions such as mist or fogging.

[0105] Direct level detection by the level sensor (214) also allows differentiation between a filled waste collector (16) and an occluded condition such as blockage in the tubing (14) that may result in a deviation from the reference airflow range. Based on a signal provided by the direct level sensor (214) to the error detector (216), the error indicator (234) of the annunciator (230) can illuminate a visual indicator and/or an audible alarm distinct from the flow status indicator (232) used to display normal or abnormal flow

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conditions. Providing the clinician a distinction between filled waste collector condition and an occlusion makes the system easier to use and less prone to user error.

[0106] Since the patients may be mobile or need to be transported, there is a potential that agitation and motion can create artifact where fluid may splash and cause a false positive indication of a filled waste collector (16) and subsequently trigger an unwarranted signal or alarm. An algorithm may be used by the error detector (216) to minimize the likelihood of this false indication. The algorithm incorporates a time delay and a sampling rate. For example, a sampling rate of 10 milliseconds and a delay of 4 seconds has been shown to be an effective set of parameters for reducing false full indications due to the motion artifact. Preferably the algorithm is programmed into the error detector (216) of the pump unit controller (200).

Timing Subsystem and Compliance Monitor

[0107] The pump unit controller (200) may have a timing subsystem (218) for recording and accumulating time units corresponding to periods of time when the pump (103) is running. Preferably the timing subsystem (218) records and accumulates the pump operating time units based upon inputs from various sensors. For example, the timing can be started and stopped by signals from the Mode Selector switch (204), or signals that can detect when the pump is running from the tachometer (212) or other sensor. The timing subsystem (218) preferably is capable of providing time reports of the time history of operation of the pump (103). The time reports may include a record of runtime intervals, a record of the date and duration of runtime intervals, a record of total accumulated runtime, a record of accumulated compliant runtime, and a record of runtime remaining on a preset runtime period.

[0108] The timing subsystem (218) of the pump unit controller (200) may include an onboard compliance monitor as part of the timing function. A compliance indicator (236) alerts the caregiver to deviations from the normal application of suction to the wound over time and is a useful adjunct to the application of negative pressure wound therapy. The compliance monitor may compute the number of hours that suction has been within ±5 mm Hg of a pressure setpoint. Medical experience has shown that suction is preferably applied for 22 of any 24 continuous hours to be effective. The compliance indicator (236) can show

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and record in numerous ways the number or percentage of compliant hours of suction therapy for a given therapy period.

[0109] The timing subsystem (218) may be connected to alarms which indicate abnormal operating conditions due to leak or occlusion. The timing subsystem (218) may also be used to indicate time remaining until scheduled maintenance or cleaning, or to indicate time used or remaining on a billing plan where the payments for usage are based upon time units either on return or pre-paid in advance. When the pump unit (102) is sold or leased in this manner, the timing subsystem (218) has the ability to record and accumulate time units corresponding to periods of time when the pump (103) is running and for providing reports of runtime, including compliant runtime when the wound treatment system (10) is operating normally.

Error Detection and Display

[0110] The pump unit (102) may include warning or caution lights indicating pump operating parameters, or errors other than those that are detected by deviations from the reference airflow rate. Numerous combinations of visual and audible indicators may be sued to display such status, fault, or error conditions. In the schematic embodiment of Figure 6, a visual error indicator (234), separate from the flow status indicator (232), provides additional trouble shooting assistance. Various errors may be detected based on sensor signals received by the error detector (216). The error indicator (234) preferably includes an alphanumeric error display, and the error detector (216) can cause the error display to provide indications that correlate to at least following errors: overpressure (i.e., suction exceeding a prescribed limit), missing waste collector, pressure transducer failure, low battery, low operating time remaining, and attachment of incorrect power supply.

[0111] Overpressure is the condition where a runaway pump (103) could cause potentially high negative pressures to be delivered to the patient. The error detector (216) continually polls the output of the pressure transducer (208) and compares it to a stored maximum allowable pressure. If the maximum allowable pressure is exceeded for a predetermined time period, then the pressure controller (202) causes the pump (103) to stop operating and an overpressure error is indicated on the error indicator (234).

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[0112] A missing waste collector condition occurs if the pump (103) is activated without a waste collector (16) installed in the docking station (160) and connected to the latch fitting (164). This condition can occur at startup or during operation, and is detected by the error detector (216) as flow through the system exceeding a certain level without a corresponding minimal increase in pressure. The threshold flow rate for detecting a missing waste collector is typically set to be greater than the increased flow that would be expected from a wound dressing that was removed or compromised. When so detected, a missing waste collector error is indicated on the error indicator (234).

[0113] A pressure transducer failure can take two forms: an excessively high reading indicative of high vacuum or an open circuit (no pressure reading). A high vacuum reading would be interpreted as an overpressure condition, as described above, and would result in a fail-safe deactivation of the pump (103). An open circuit failure appears as zero pressure output, so if the error detector (216) detects air flow but zero pressure, a transducer failure error is indicated on the error indicator (234).

[0114] A low battery charge is determined by the error detector (216) polling the battery output voltage when the pump unit (102) is not plugged into an external electrical power source. When a threshold low voltage level is crossed, a low battery error is indicated on the error indicator (234).

[0115] Low operating time remaining is associated with the timing feature of the pump unit controller (200) when it is used to indicate time remaining until scheduled maintenance service or time remaining on a pre-paid rental plan. The timing system (218) constantly accumulates runtime and time remaining to a target time, such as the number of pre-paid hours. The error detector (216) can be set to a time remaining threshold, such that when the accumulated time indicates that time remaining has dropped below the threshold, a low time error is indicated on the error indicator (234).

[0116] Incorrect power supply detection is to guard against providing excessive voltage to the system. This is accomplished by comparing the input voltage to a set maximum level and detecting if voltage exceeds the maximum level. The error detector (216) detects the

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excess voltage and shuts down the pump (103), and an incorrect power error is indicated on the error indicator (234).

Collection Line Pulse System

[0117] The pump unit (102) may include a collection line pulse feature to ensure that the collection line is maintained as clear as practical to minimize the amount of fluid in the line and ensure accurate delivery of the negative pressure. When the flow monitor (210) begins to detect a deviation from the reference airflow rate so as to indicate an occlusion, the pressure controller (202) can temporarily reset the pressure setpoint temporarily to a pressure higher than the selected pressure, causing the pump (103) to start or to increase in speed. This pump activation or acceleration causes a pressure pulse of transient high negative pressure in the system conduit to clear the tube (14) between the wound dressing (12) and the waste collector (16). The pressure pulse is initiated prior to the illumination of an occlusion indication on the flow status indicator (232). An occlusion indication will not occur if the pressure pulse is followed by decay in the pressure measured by the pressure transducer (208), because a decay in pressure would indicate a cleared collection line and the absence of an occlusion. Once the flow monitor (210) again detects a normal fluid flow rate, the pressure controller (202) resets the pressure setpoint to the selected pressure.

Additional Features

[0118] In order to enhance safety of the negative pressure wound therapy system (10), the pressure controller (202) can operate independently of the flow monitor (210) and error detector (216) in the pump unit controller (200). This provides a measure of system redundancy in the event that one or the other function should fail. Should the pressure controller (202) fail, the flow monitor (210) and/or error detector (216) are capable of shutting down the pump unit (102), and should the flow monitor (210) fail, the pressure controller (202) will continue to provide suction to the wound.

[0119] The pump unit (102) may have a charcoal filter element (not shown) for controlling odors that may emanate from the patient through the pump (103). This element is placed on the outlet of the pump (103) and can be readily changed and replaced. Also, desiccants can be used in conjunction with the filter to minimize moisture in the exhaust from the pump (103).

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[0120] Positive displacement pumps typically employ check valves which make noise. Accordingly, the pump unit (102) may employ a backpressure device in the form of a leaf spring (not shown) that is placed over the outlet of the pump (103) to reduce the noise emanating from the pump check valves.

Flow Measurement Alternatives

[0121] There are other devices for determining the flow through the system that could be employed as leak detection devices in a wound dressing system operating with a reference airflow. These devices measure flow directly, and thus can be used with non-positive displacement pumps and wall vacuum sources as well as with positive displacement pumps. As shown in Figure 7, a target meter (120) is a reliable device for flow detection that is insensitive to changes in pressure. The target meter (120) employs an inlet orifice (122) and a target (124) typically placed in close proximity to the orifice. The target is attached to a shaft (126) and pivots on points (128) or an armature. A light torsion spring (not shown) may be used to keep the target in close proximity to the orifice. The extension of the shaft is placed outside of the flow path. As flow enters the orifice, the target is forced away from the orifice. A proximity sensor, such as a reed switch (130) is so placed as to detect the positions of a magnet (132) on the end of the shaft extension and thus the presence or absence of flow in the circuit as well as measuring flow rate. A target meter could be placed between the waste collection canister and the pump or at the outlet of the pump, or between the waste collection canister and a stationary suction source to provide analogous flow rate information as previously described.

[0122] Other flow detection devices that could be used alone or in conjunction with a suction source include a hot wire anemometer that determines flow as a function of the cooling of a wire in a flowing air stream, a rotameter with an optical detector that senses the position of a float, a turbine meter that rotates when flow is applied. These flow detection systems are generally insensitive to changes in pressure. A hot wire anemometer could be placed between the waste collector (16) and the pump (103) or at the inlet of the pump (103), or between the waste collector (16) and or a stationary suction source. These alternative flow sensors allow the use of other styles of pumps that are not positive displacement, such as vane pumps and scroll pumps. Almost any flow instrument could be

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used, including, for example, differential pressure (DP) cells that provide an indirect measure of flow rate.

[0123] When any fault condition is determined within the system, the pump (103) will continue to run, delivering a sub-optimal level of suction, until the condition is corrected or the user powers the system off, since a sub-optimum level of suction applied to the wound is preferable to no suction at all.

Therapeutic Fluid Delivery and Reference Airflow

[0124] In the embodiments described above, the reference airflow for discerning between normal and abnormal operation has been ambient air supplied to the suction conduit through a vent. A reference airflow could be provided, however, in the form of a therapeutic mixture, such as oxygen enriched air, nitric oxide, heated humidified air or an aerosol containing medication droplets or particles. Such a configuration is shown in Figure 8. A source of therapeutic mixture (150), such as an oxygen regulator or a nebulizer, is connected to a conduit (152) leading to the wound. The mixture is conveyed through the conduit under or through the wound cover (122) and released into the wound packing (124) adjacent the wound contact material (126). Part of this mixture will be absorbed, but enough could be returned through the suction conduit (114) to provide a reference airflow when the flow has settled into equilibrium.

[0125] While a flow monitor (210) could be associated with a portable pump unit (102) or in front of the appliance fitting of a suction regulator (20), as described above, an airflow monitor (154) could be provided between the therapeutic mixture source (150) and the wound cover (122). Since the part of the conduit beneath the cover would be contaminated in use, a detachable disposable tube (156) would be used for the section of conduit from the monitor (154) to the wound packing (112). Thus, the invention can provide for the maintenance of suction therapy on a wound as well as the ability to monitor the application and removal of therapeutic substances to the wound.

[0126] Although the invention has been described and illustrated with respect to several embodiments described above, it should be understood the invention may be embodied in other forms without departing from its scope or attributes. Hence, the scope of the

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invention should be derived from the claims that follow, recognizing that the claim language may literally encompass structure not specifically described.

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Claims

We claim:

1. A pump for applying suction to a wound in a negative pressure wound therapy system, the pump comprising a flow monitor to monitor fluid flow rate in a system conduit from a wound dressing to the pump as indicative of a level of negative pressure applied to a wound, the flow monitor detecting whether or not the flow rate deviates from a reference airflow rate, the flow monitor comprising a gradated non-numerical visual annunciator to indicate flow conditions including that the flow rate is below the reference airflow rate range so as to indicate an occlusion in the system, that the flow rate is within the reference airflow rate range so as to indicate normal operation, that the flow rate is at a first level above the reference airflow rate range so as to indicate a first level of leakage in the system, or that the flow rate is at a second level above the reference airflow rate range so as to indicate a second higher level of leakage in the system, the second level being a greater deviation from the reference airflow than the first level.

2. A pump as in claim 1, wherein the gradated annunciator comprises a color-coded bar meter for displaying a different color corresponding to each flow condition.

3. A pump as in claim 1, wherein the pump is a positive displacement pump.

4. A pump as in claim 1, further including:

an error detector for detecting one or more system errors that are not associated with a deviation of flow rate from the reference airflow; and

an error indicator for displaying a visual warning of system errors detected by the error detector.

5. A pump as in claim 1, further comprising:

a pressure transducer for sensing pressure in the system; and

a pressure controller for controlling the pump to maintain the system pressure between an upper limit and a lower limit around a pressure setpoint, wherein the pressure controller can control the pump without input from the flow monitor.

6. A pump as in claim 5, the pressure controller further comprising a timer for periodically resetting the pressure setpoint between a user-selected pressure and a second

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pressure lower than the user-selected pressure for providing intermittent negative pressure therapy to the wound.

7. A pump as in claim 5, wherein the pressure controller further receives an input from the flow monitor when the flow monitor begins to detect a deviation of the flow rate below the reference airflow rate that indicates an occlusion in the system, such that the pressure controller causes the pressure setpoint to temporarily increase above the user-selected pressure, causing the pump to start or to increase in speed to create a negative pressure pulse capable of clearing the system conduit between the wound dressing and the waste collector.

8. A pump as in claim 7, wherein the pressure pulse is initiated prior to the gradated indicator providing indication of an occlusion, and wherein the gradated indicator will not provide an indication of an occlusion if the negative pressure pulse is followed by a decay in the pressure.

9. A pump as in claim 1, further comprising:

a waste collector located in the system between the wound dressing and the flow monitor for collecting liquids aspirated from the wound;

a docking station for releasably supporting the collector; and

a level sensor proximate to the docking station for detecting the level of waste in the collector.

10. A pump as in claim 9, wherein the level sensor is a capacitance detector.

11. A pump as in claim 9, wherein the level sensor is an optical detector.

12. A pump as in claim 9, wherein the level sensor provides a signal representing a level of waste in the collector and an algorithm is applied to the signal to reduce the likelihood of an erroneous indication of a full collector when the collected waste is sloshed.

13. A pump as in claim 9, wherein the gradated annunciator is further capable of providing visual indication of a full collector.

14. A pump as in claim 1, further comprising a timing subsystem to record and accumulate time units based upon inputs from various sensors.

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15. A pump as in claim 14, wherein the timing subsystem is further capable of providing reports of time histories of pump operation including one or more reports chosen from the group consisting of: a record of runtime intervals, a record of the date and duration of runtime intervals, a record of total accumulated runtime, a record of accumulated compliant runtime, and a record of runtime remaining on a preset runtime period.

16. A system for applying negative pressure therapy to a wound, comprising:

a wound dressing including a wound cover that is sealable to skin surrounding a wound;

a portable suction pump powered by a battery or by an alternating current electrical power supply, the pump comprising a flow monitor to detect the flow rate in the conduit;

a conduit having an end operatively associated with the wound dressing and an opposite end operatively associated with the suction pump, to communicate suction to the wound; and

a waste collector disposed in the conduit between the wound dressing and the suction pump for collecting liquids aspirated from the wound, the waste collector being releasably supported by a docking station on the pump;

wherein the pump includes a sensor proximate to the docking station for detecting the level of waste in the collector; and

wherein the flow monitor comprises a non-numerical annunciator capable of providing visual indications of flow conditions including that the flow rate is below the reference airflow rate range so as to indicate an occlusion in the system, that the flow rate is within the reference airflow rate range so as to indicate normal operation, that the flow rate is at a first level above the reference airflow rate range so as to indicate a first level of leakage in the system, that the flow rate is at a second level above the reference airflow rate range so as to indicate a second higher level of leakage in the system, the second level being a greater deviation from the reference airflow rate than the first level, or that the waste collector is full.

17. A system as in claim 16, further comprising:

a pressure transducer for sensing pressure in the system; and

a pressure controller for controlling the pump to maintain the system pressure between an upper limit and a lower limit around a pressure setpoint.

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18. A system as in claim 16, further including an error indicator for displaying a visual warning of one or more system errors that are not associated with a deviation of flow rate through the pump from the reference airflow rate, wherein the system errors are chosen from the group consisting of: overpressure detected by the pressure transducer, pressure transducer failure, waste collection canister not attached, low battery voltage, attachment of incorrect power supply, low operating time remaining, collection canister full, and pump motor not operational.

19. A method for applying suction to a wound in a negative pressure wound therapy system comprising:

providing a suction pump;

providing a pressure transducer for sensing pressure in the system;

controlling the pump to maintain the system pressure between an upper limit and a lower limit around a pressure setpoint;

providing a flow monitor to monitor fluid flow rate in the system and to detect whether the flow rate deviates from a reference airflow rate; and

providing a gradated non-numerical visual annunciator to indicate flow conditions including that the flow rate is below the reference airflow rate range so as to indicate an occlusion in the system, that the flow rate is within the reference airflow rate range so as to indicate normal operation, that the flow rate is at a first level above the reference airflow rate range so as to indicate a first level of leakage in the system, or that the flow rate is at a second level above the reference airflow rate range so as to indicate a second higher level of leakage in the system, the second level being a greater deviation from the reference airflow than the first level.

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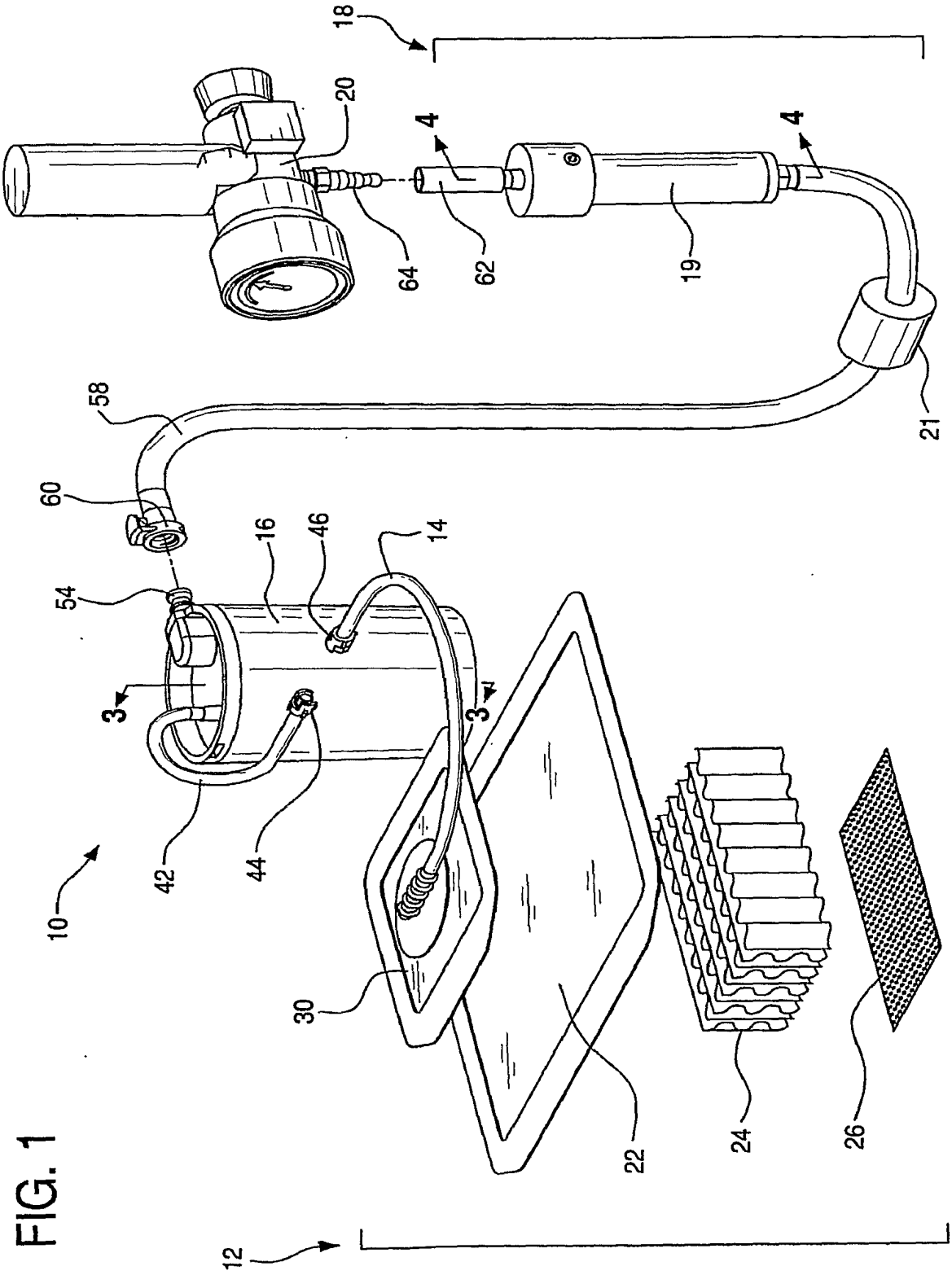


FIG. 1

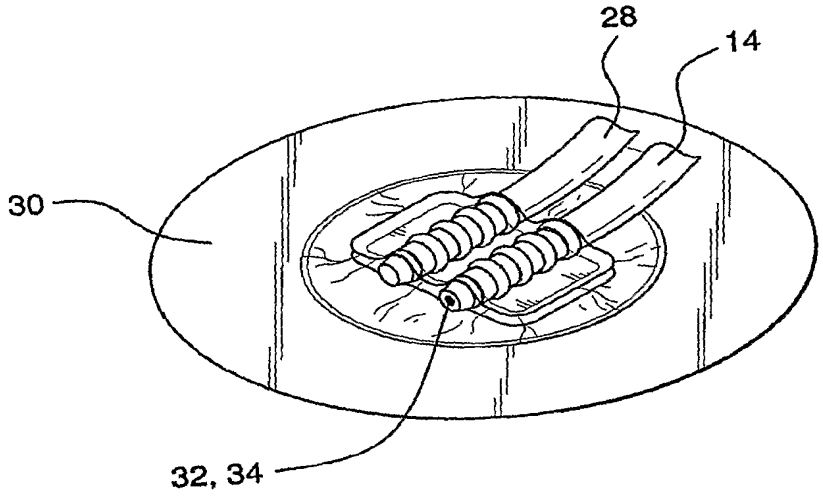


FIG. 2

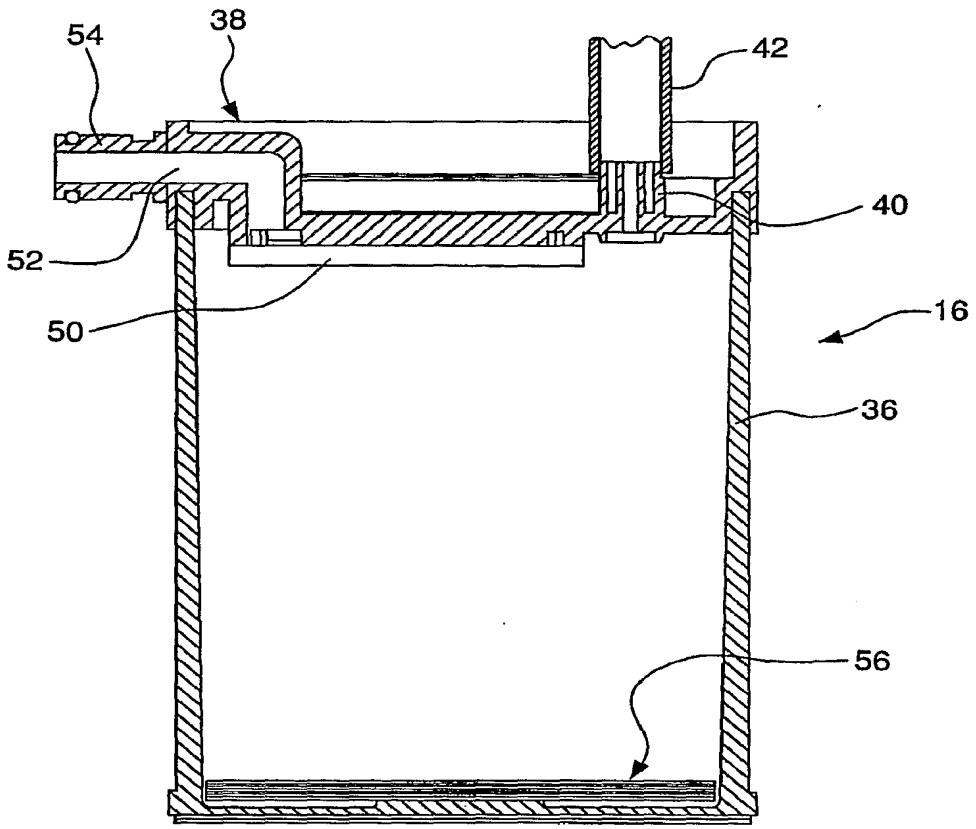


FIG. 3

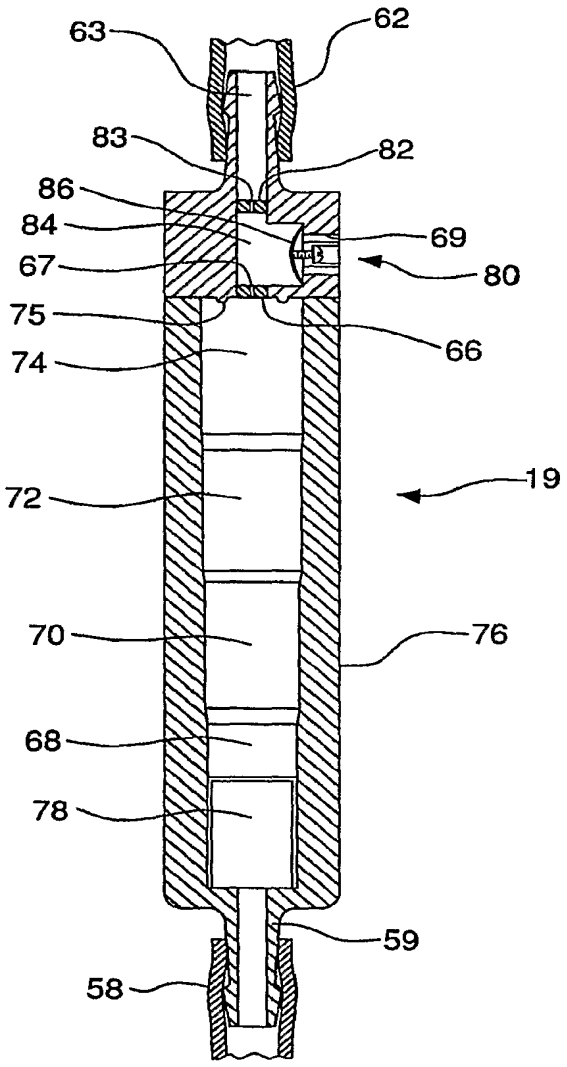


FIG. 4

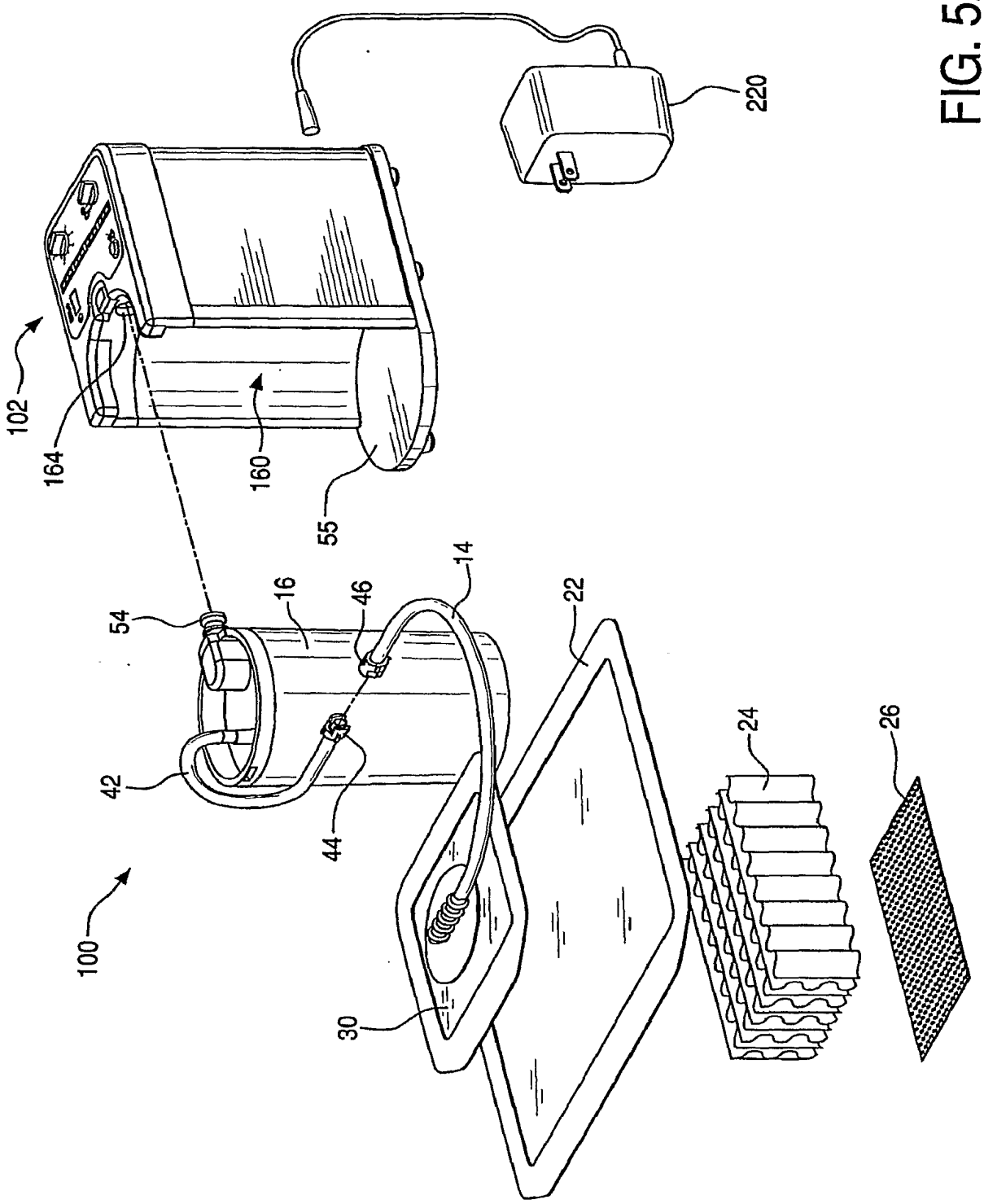


FIG. 5A

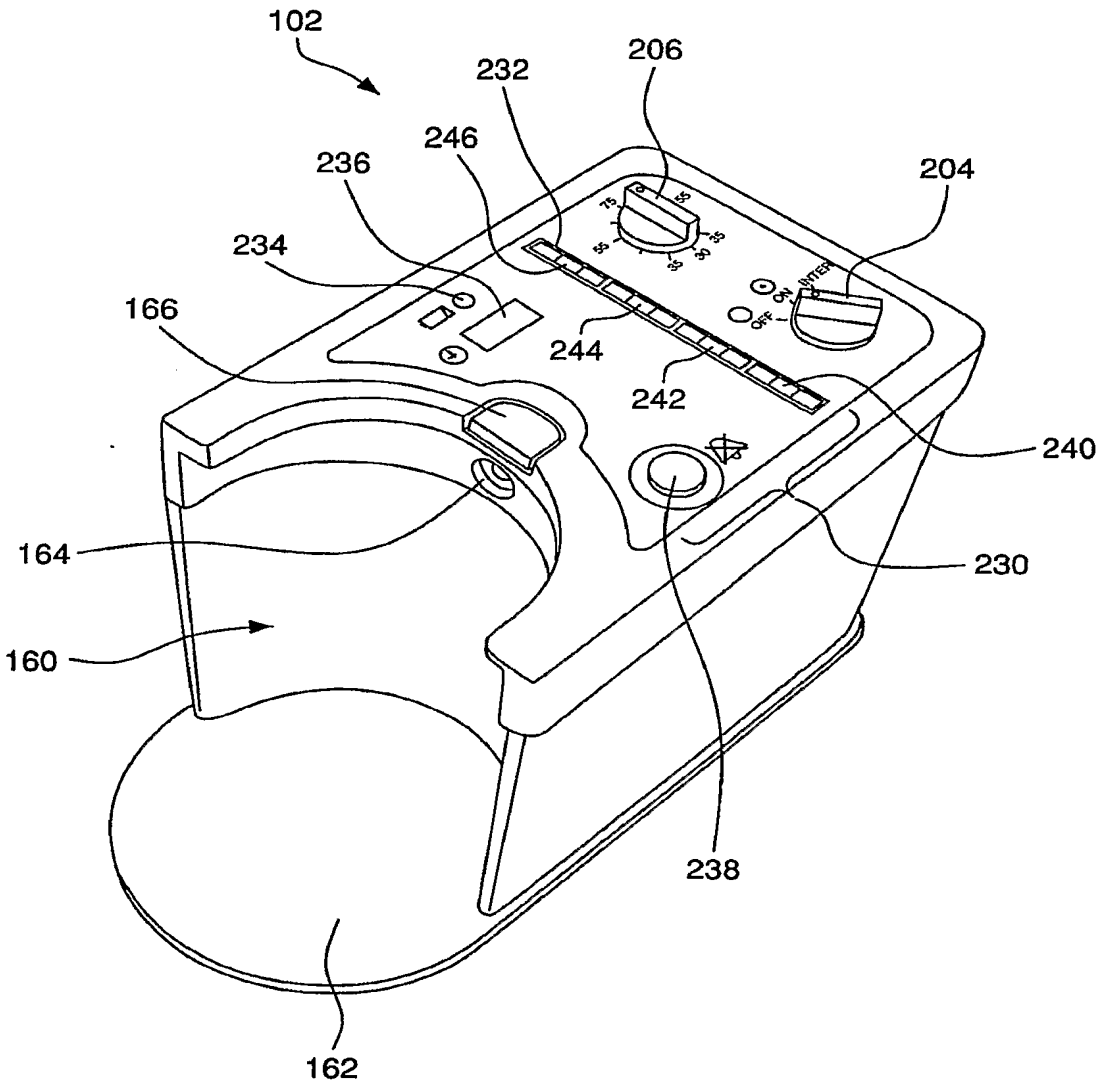


FIG. 5B

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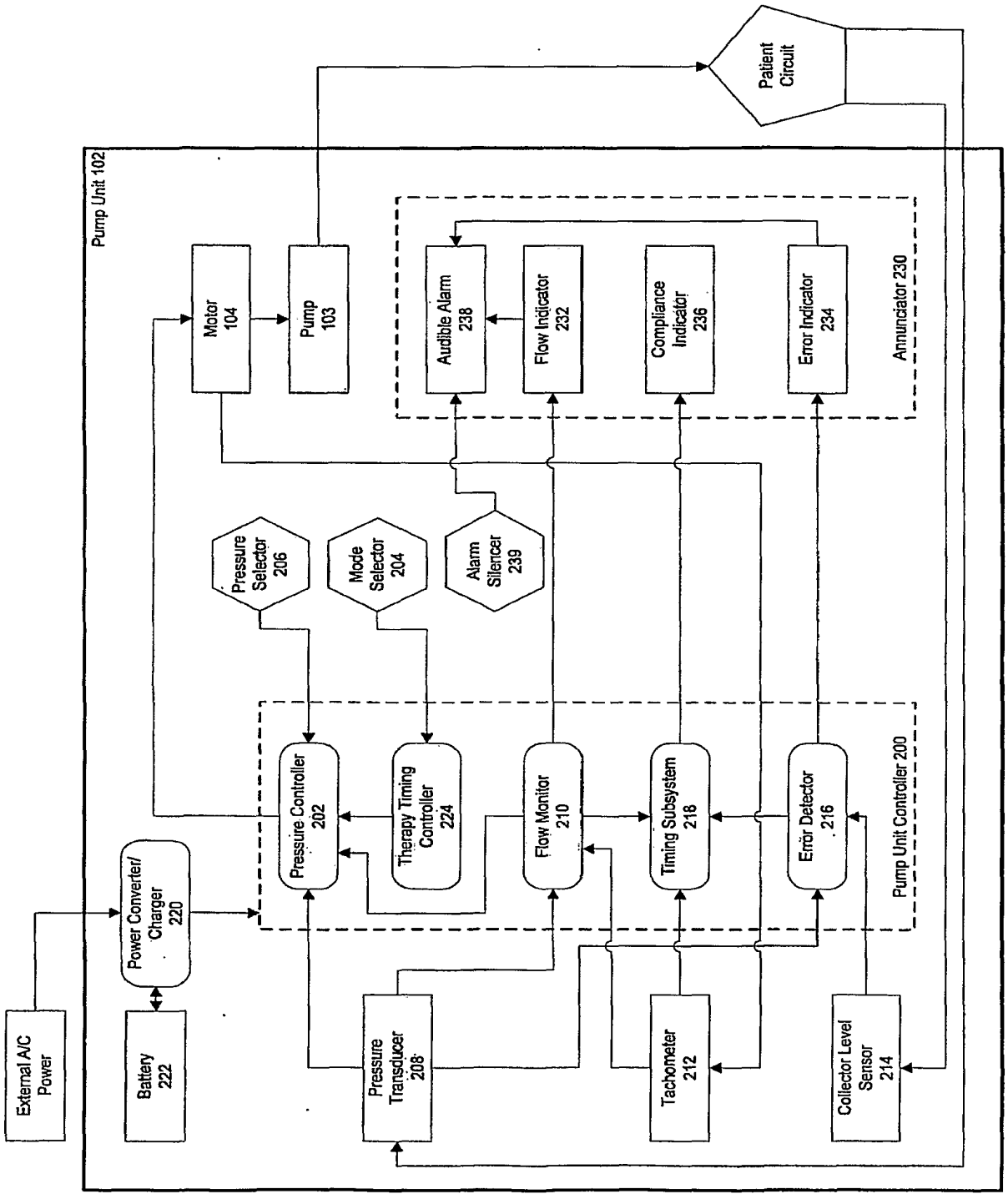


FIG. 6

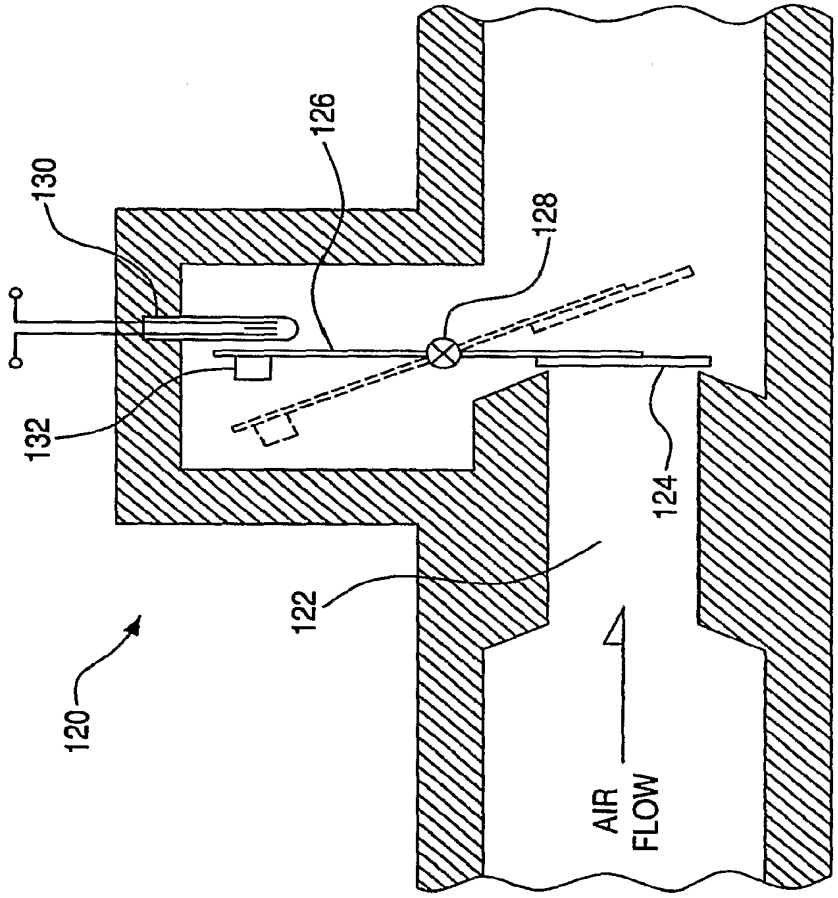


FIG. 7

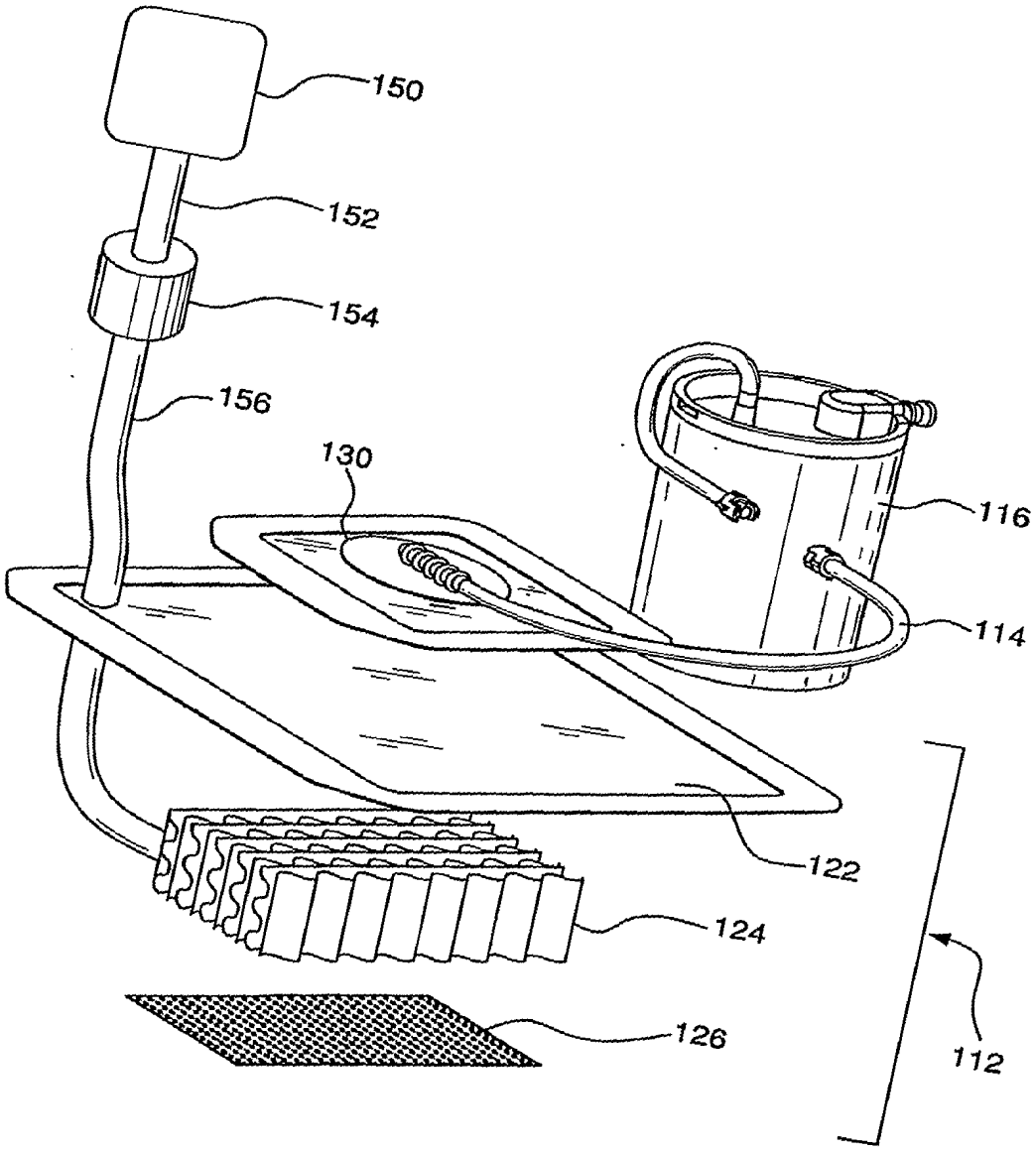


FIG. 8

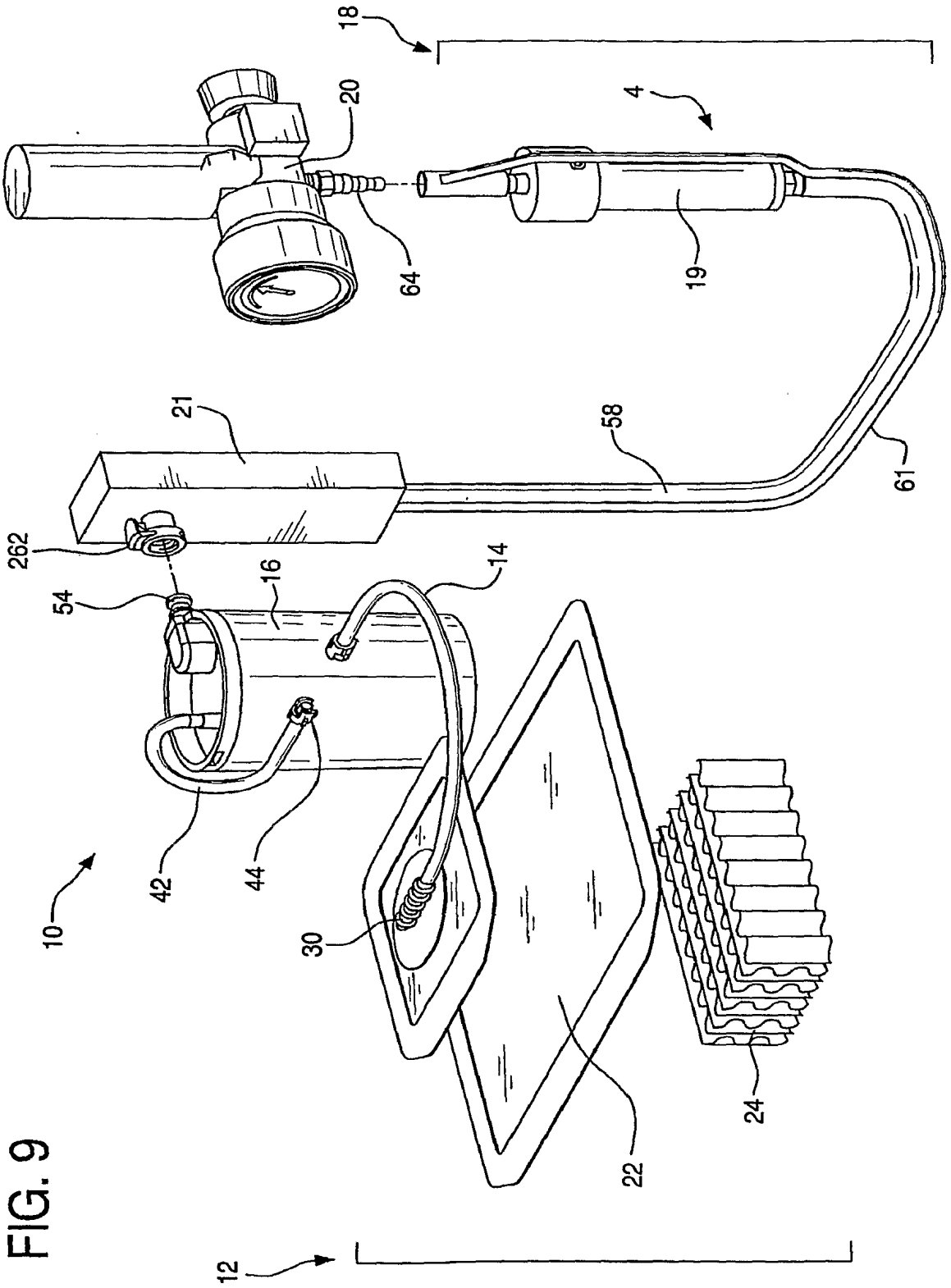


FIG. 9

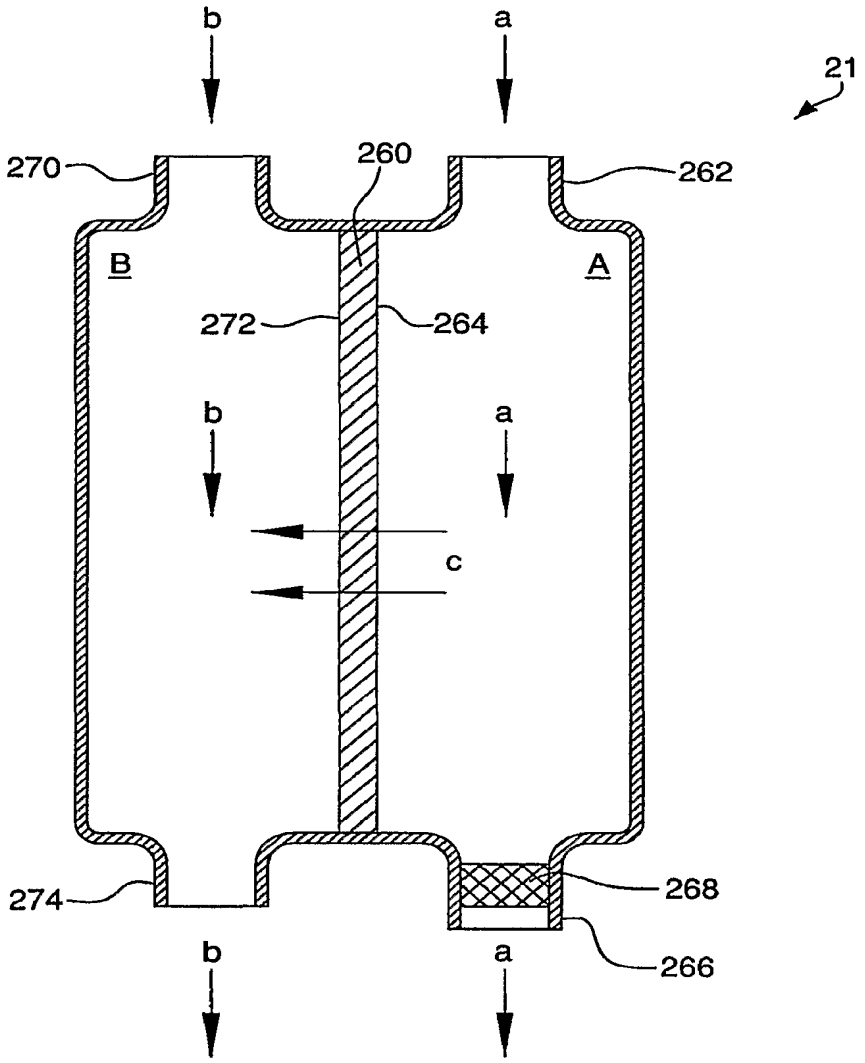


FIG. 10

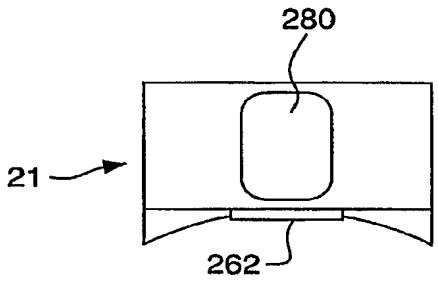
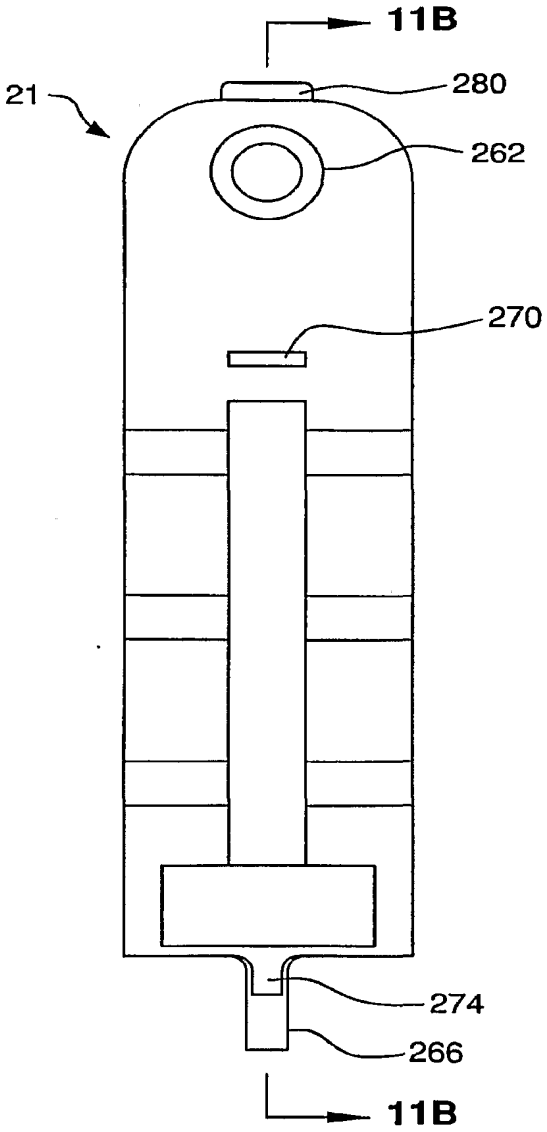


FIG. 11C



IG. 11A

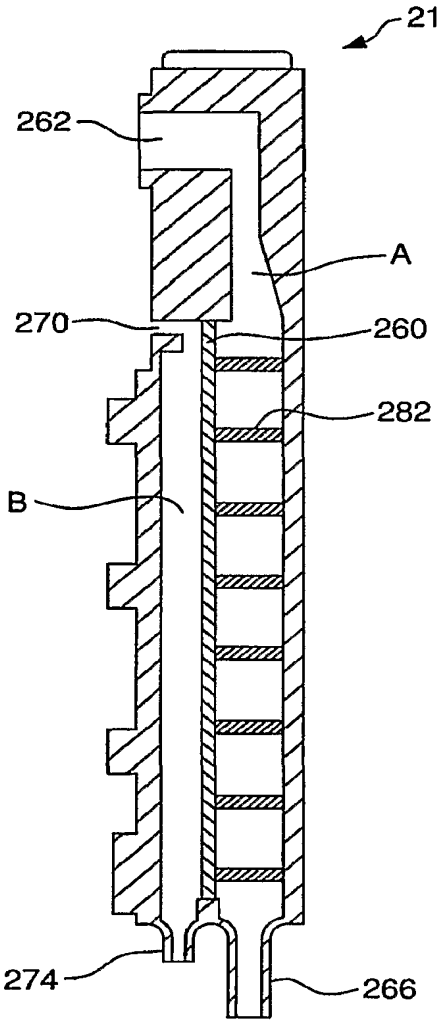


FIG. 11B

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
1198929711989297	ADAHAN, CARMELIADAHAN, CARMELI
Examiner	**Art Unit**
ILYA TREYGERILYA TREYGER	37613761

CPC		
Symbol	**Type**	**Version**

CPC Combination Sets				
Symbol	**Type**	**Set**	**Ranking**	**Version**

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
604	540

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
604	35	305	306	307	308
604	313	317	318	319	320
604	321	322	323	540	541
604	542	543	544	902	
606	131				

INTERNATIONAL CLASSIFICATION					
CLAIMED					**NON-CLAIMED**
A	6	1	M	1 / 00	

/ILYA TREYGER/ Examiner.Art Unit 3761	04/03/2013	**Total Claims Allowed:**
(Assistant Examiner)	(Date)	29
(Primary Examiner)	(Date)	O.G. Print Claim(s): 1 / O.G. Print Figure: 1

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
1198929711989297	ADAHAN, CARMELIADAHAN, CARMELI
Examiner	**Art Unit**
ILYA TREYGERILYA TREYGER	37613761

☒ 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	11	17	47												
2	13	18	48												
3	14	19	49												
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5	35	21	51												
6	36	22	52												
7	37	23	53												
8	38	24	54												
9	39	25	55												
10	40	26	56												
11	41	27	57												
12	42	28	58												
13	43	29	59												
14	44														
15	45														
16	46														

/ILYA TREYGER/ Examiner.Art Unit 3761	04/03/2013	**Total Claims Allowed:** 29	
(Assistant Examiner)	(Date)		
		O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Solventum-Exhibit 1013-0960

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11989297	ADAHAN, CARMELI
	Examiner	Art Unit
	ILYA TREYGER	3761

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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	6	-	-	-	-	-	-			
	7	-	-	-	-	-	-			
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	9	-	-	-	-	-	-			
	10	-	-	-	-	-	-			
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3	14	✓	✓	✓	✓	=	=			
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Solventum-Exhibit 1013-0961

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11989297	ADAHAN, CARMELI
	Examiner	**Art Unit**
	ILYA TREYGER	3761

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	10/05/2010	04/15/2011	09/26/2011	05/22/2012	09/14/2012	04/03/2013			
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8	38		✓	✓	✓	=	=			
9	39		✓	✓	✓	=	=			
10	40		✓	✓	✓	=	=			
11	41		✓	✓	✓	=	=			
12	42		✓	✓	✓	=	=			
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14	44		✓	✓	✓	=	=			
15	45		✓	✓	✓	=	=			
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26	57						=			
27	58						=			
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Solventum-Exhibit 1013-0962

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L2	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L3	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L4	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L5	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L6	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L7	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L8	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L9	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L10	39	L2 and L3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
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L12	252	L2 and L5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L13	415	L2 and L6	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L14	201	L2 and L7	US-PGPUB;	OR	OFF	2013/04/03

Solventum-Exhibit 1013-0963

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L28	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
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L30	39	L22 and L23	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L31	191	L22 and L24	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L32	252	L22 and L25	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L33	415	L22 and L26	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L34	201	L22 and L27	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L35	9	L22 and L28	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L36	9	L22 and L29	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
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L44	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L45	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L46	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L47	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L48	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L49	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L50	39	L42 and L43	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L51	191	L42 and L44	US-PGPUB; USPAT; USOCR;	OR	OFF	2013/04/03 13:34

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L54	201	L42 and L47	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L55	9	L42 and L48	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L56	9	L42 and L49	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
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Solventum-Exhibit 1013-0967

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L64	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L65	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L66	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L67	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L68	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L69	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L70	39	L62 and L63	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L71	191	L62 and L64	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L72	252	L62 and L65	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L73	415	L62 and L66	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L74	201	L62 and L67	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L75	9	L62 and L68	US-PGPUB;	OR	OFF	2013/04/03

Solventum-Exhibit 1013-0968

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			13:34
L76	9	L62 and L69	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L77	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L78	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L79	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L80	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L82	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L83	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L84	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L85	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L86	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L87	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34

Solventum-Exhibit 1013-0969

L88	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L89	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L90	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L91	39	L83 and L84	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L92	191	L83 and L85	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L93	252	L83 and L86	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L94	415	L83 and L87	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L95	201	L83 and L88	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L96	9	L83 and L89	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L97	9	L83 and L90	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L98	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L99	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L100	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L101	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" |	US-PGPUB; USPAT;	OR	OFF	2013/04/03 13:34

Solventum-Exhibit 1013-0970

		"3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	USOCR			
L102	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L103	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L104	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L105	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L106	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L107	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L108	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L109	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L110	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L111	39	L103 and L104	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L112	191	L103 and L105	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L113	252	L103 and L106	US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	OFF	2013/04/03 13:34

			DERWENT; IBM_TDB			
L114	415	L103 and L107	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L115	201	L103 and L108	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L116	9	L103 and L109	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L117	9	L103 and L110	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L118	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L119	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L120	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L121	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L122	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34

L123	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L124	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L125	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L126	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L127	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L128	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L129	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L130	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L131	39	L123 and L124	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L132	191	L123 and L125	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L133	252	L123 and L126	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L134	415	L123 and L127	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L135	201	L123 and L128	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L136	9	L123 and L129	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L137	9	L123 and L130	US-PGPUB; USPAT; USOCR;	OR	OFF	2013/04/03 13:34

Solventum-Exhibit 1013-0973

			EPO; JPO; DERWENT; IBM_TDB			
L138	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L139	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L140	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L141	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L142	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L143	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L144	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L145	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L146	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L147	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L148	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L149	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L150	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:34
L151	39	L143 and L144	US-PGPUB;	OR	OFF	2013/04/03

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			13:34
L152	191	L143 and L145	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L153	252	L143 and L146	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L154	415	L143 and L147	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L155	201	L143 and L148	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L156	9	L143 and L149	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L157	9	L143 and L150	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L158	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L159	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L160	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34
L161	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" |	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:34

Solventum-Exhibit 1013-0975

		"4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
L162	39	L98 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L163	55	L99 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L164	27	L100 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L165	67	L101 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L166	75	"4108574" "4208171"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L167	0	L166 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L168	6	L166 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L169	6	"20040015042" "20050180868"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L170	67	"4552552"	US-PGPUB; USPAT; EPO; DERWENT;	OR	OFF	2013/04/03 13:34

Solventum-Exhibit 1013-0976

			IBM_TDB			
L171	36	L170 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L172	0	L170 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L173	26	"5116206" "7503910"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:34
L174	7	L173 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L176	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L177	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L178	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L179	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L180	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L181	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L182	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L183	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L184	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L185	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L186	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L187	39	L179 and L180	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L188	191	L179 and L181	US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0977

			DERWENT; IBM_TDB			
L189	252	L179 and L182	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L190	415	L179 and L183	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L191	201	L179 and L184	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L192	9	L179 and L185	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L193	9	L179 and L186	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L194	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L195	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L196	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L197	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415"	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0978

		"5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
L198	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L199	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L200	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L201	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L202	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L203	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L204	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L205	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L206	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L207	39	L199 and L200	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L208	191	L199 and L201	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L209	252	L199 and L202	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L210	415	L199 and L203	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L211	201	L199 and L204	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L212	9	L199 and L205	US-PGPUB; USPAT;	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0979

			USOCR; EPO; JPO; DERWENT; IBM_TDB			
L213	9	L199 and L206	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L214	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L215	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L216	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L217	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L218	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L219	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L220	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L221	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L222	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L223	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L224	1726	(604/540-544).CCLS.	US-PGPUB;	OR	OFF	2013/04/03

			USPAT			13:35
L225	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L226	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L227	39	L219 and L220	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L228	191	L219 and L221	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L229	252	L219 and L222	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L230	415	L219 and L223	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L231	201	L219 and L224	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L232	9	L219 and L225	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L233	9	L219 and L226	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L234	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L235	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L236	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L237	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" |	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0981

		"4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
L238	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L239	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L240	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L241	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L242	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L243	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L244	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L245	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L246	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L247	39	L239 and L240	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L248	191	L239 and L241	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L249	252	L239 and L242	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT;	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0982

			IBM_TDB			
L250	415	L239 and L243	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L251	201	L239 and L244	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L252	9	L239 and L245	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L253	9	L239 and L246	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L254	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L255	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L256	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L257	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L258	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0983

L259	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L260	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L261	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L262	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L263	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L264	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L265	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L266	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L267	39	L259 and L260	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L268	191	L259 and L261	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L269	252	L259 and L262	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L270	415	L259 and L263	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L271	201	L259 and L264	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L272	9	L259 and L265	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L273	9	L259 and L266	US-PGPUB; USPAT; USOCR;	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0984

			EPO; JPO; DERWENT; IBM_TDB			
L274	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L275	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L276	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L277	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L278	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L279	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L280	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L281	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L282	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L283	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L284	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L285	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L286	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L287	39	L279 and L280	US-PGPUB;	OR	OFF	2013/04/03

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			13:35
L288	191	L279 and L281	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L289	252	L279 and L282	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L290	415	L279 and L283	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L291	201	L279 and L284	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L292	9	L279 and L285	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L293	9	L279 and L286	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L294	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L295	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L296	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L297	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" |	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35

		"4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
L298	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L299	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L300	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L301	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L302	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L303	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L304	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L305	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L306	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L307	39	L299 and L300	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L308	191	L299 and L301	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L309	252	L299 and L302	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L310	415	L299 and L303	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT;	OR	OFF	2013/04/03 13:35

			IBM_TDB			
L311	201	L299 and L304	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L312	9	L299 and L305	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L313	9	L299 and L306	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L314	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L315	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L316	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L317	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L318	59	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L319	14871	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0988

L320	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L321	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L322	409	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L323	2428	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L324	1726	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L325	256	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L326	596	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L327	39	L319 and L320	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L328	191	L319 and L321	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L329	252	L319 and L322	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L330	415	L319 and L323	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L331	201	L319 and L324	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L332	9	L319 and L325	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L333	9	L319 and L326	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L334	130	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35

L335	246	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L336	175	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L337	333	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/04/03 13:35
L338	39	L274 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L339	55	L275 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L340	27	L276 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L341	67	L277 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L342	75	"4108574" "4208171"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L343	0	L342 and (air adj hole)	US-PGPUB; USPAT; EPO;	OR	OFF	2013/04/03 13:35

Solventum-Exhibit 1013-0990

			DERWENT; IBM_TDB			
L344	6	L342 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L345	6	"20040015042" "20050180868"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L346	67	"4552552"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L347	36	L346 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L348	0	L346 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L349	26	"5116206" "7503910"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L350	7	L349 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2013/04/03 13:35
L351	940	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
L352	990	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2013/04/03 13:35
S1	53	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/10/05 16:32
S2	11641	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:47
S3	851	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:48
S4	746	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:48
S5	266	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:48
S6	1805	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:49

S7	1255	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:49
S8	250	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:49
S9	505	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/10/05 16:49
S10	17	S2 and S3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:49
S11	119	S2 and S4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:50
S12	126	S2 and S5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:50
S13	117	S2 and S6	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:50
S14	109	S2 and S7	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:50
S15	7	S2 and S8	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:50
S16	4	S2 and S9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/10/05 16:50
S17	63	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/10/05 16:51
S18	99	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/10/05 16:52
S19	73	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/10/05 16:52
S20	154	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" |	US-PGPUB; USPAT;	OR	OFF	2010/10/05 16:52

Solventum-Exhibit 1013-0992

		"3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	USOCR			
S21	54	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 11:54
S22	12345	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S23	881	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S24	784	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S25	290	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S26	1923	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S27	1341	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S28	251	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S29	521	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 11:54
S30	18	S22 and S23	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S31	135	S22 and S24	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S32	149	S22 and S25	US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	OFF	2011/04/15 11:54

Solventum-Exhibit 1013-0993

			DERWENT; IBM_TDB			
S33	169	S22 and S26	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S34	125	S22 and S27	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S35	7	S22 and S28	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S36	4	S22 and S29	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 11:54
S37	74	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 11:54
S38	114	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 11:54
S39	82	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 11:54
S40	174	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 11:54
S41	54	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53

S42	12345	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S43	881	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S44	784	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S45	290	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S46	1923	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S47	1341	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S48	251	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S49	521	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S50	18	S42 and S43	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S51	135	S42 and S44	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S52	149	S42 and S45	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S53	169	S42 and S46	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S54	125	S42 and S47	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S55	7	S42 and S48	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S56	4	S42 and S49	US-PGPUB; USPAT; USOCR;	OR	OFF	2011/04/15 12:53

			EPO; JPO; DERWENT; IBM_TDB			
S57	74	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S58	114	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S59	82	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S60	174	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S61	54	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S62	12345	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S63	881	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S64	784	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S65	290	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S66	1923	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S67	1341	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S68	251	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S69	521	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/04/15 12:53
S70	18	S62 and S63	US-PGPUB;	OR	OFF	2011/04/15

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			12:53
S71	135	S62 and S64	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S72	149	S62 and S65	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S73	169	S62 and S66	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S74	125	S62 and S67	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S75	7	S62 and S68	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S76	4	S62 and S69	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/15 12:53
S77	74	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S78	114	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S79	82	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53
S80	174	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" |	US-PGPUB; USPAT; USOCR	OR	OFF	2011/04/15 12:53

		"4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
S84	55	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S85	12846	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S86	902	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S87	815	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S88	308	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S89	2020	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S90	1424	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S91	253	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S92	529	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S93	21	S85 and S86	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S94	150	S85 and S87	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S95	164	S85 and S88	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S96	214	S85 and S89	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT;	OR	OFF	2011/09/26 13:57

Solventum-Exhibit 1013-0998

			IBM_TDB			
S97	137	S85 and S90	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S98	8	S85 and S91	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S99	5	S85 and S92	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S100	88	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S101	133	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S102	94	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S103	200	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S104	55	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S105	12846	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57

Solventum-Exhibit 1013-0999

S106	902	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S107	815	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S108	308	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S109	2020	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S110	1424	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S111	253	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S112	529	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S113	21	S105 and S106	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S114	150	S105 and S107	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S115	164	S105 and S108	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S116	214	S105 and S109	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S117	137	S105 and S110	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S118	8	S105 and S111	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S119	5	S105 and S112	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S120	88	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57

S121	133	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S122	94	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S123	200	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S124	55	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S125	12846	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S126	902	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S127	815	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S128	308	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S129	2020	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S130	1424	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S131	253	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S132	529	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S133	21	S125 and S126	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S134	150	S125 and S127	US-PGPUB;	OR	OFF	2011/09/26

Solventum-Exhibit 1013-1001

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			13:57
S135	164	S125 and S128	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S136	214	S125 and S129	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S137	137	S125 and S130	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S138	8	S125 and S131	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S139	5	S125 and S132	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S140	88	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S141	133	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S142	94	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S143	200	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" |	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57

Solventum-Exhibit 1013-1002

		"4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.				
S144	55	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S145	12846	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S146	902	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S147	815	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S148	308	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S149	2020	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S150	1424	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S151	253	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S152	529	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2011/09/26 13:57
S153	21	S145 and S146	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S154	150	S145 and S147	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S155	164	S145 and S148	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S156	214	S145 and S149	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S157	137	S145 and S150	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57

Solventum-Exhibit 1013-1003

S158	8	S145 and S151	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S159	5	S145 and S152	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 13:57
S160	88	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S161	133	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S162	94	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S163	200	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/09/26 13:57
S164	26	S100 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:02
S165	32	S101 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:02
S166	15	S102 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT;	OR	OFF	2011/09/26 14:02

Solventum-Exhibit 1013-1004

			IBM_TDB			
S167	36	S103 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:02
S168	70	"4108574" "4208171"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:22
S169	0	S168 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:23
S170	5	S168 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:23
S171	6	"20040015042" "20050180868"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:24
S172	55	"4552552"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:24
S173	28	S172 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:25
S174	0	S172 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:25
S175	18	"5116206" "7503910"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:26
S176	3	S175 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2011/09/26 14:27
S178	858	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/05/24 16:07
S179	929	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/05/24 16:07
S180	56	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25

S181	14131	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S182	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S183	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S184	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S185	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S186	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S187	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S188	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S189	33	S181 and S182	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S190	172	S181 and S183	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S191	217	S181 and S184	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S192	348	S181 and S185	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S193	176	S181 and S186	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S194	9	S181 and S187	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S195	8	S181 and S188	US-PGPUB; USPAT; USOCR;	OR	OFF	2012/09/14 12:25

Solventum-Exhibit 1013-1006

			EPO; JPO; DERWENT; IBM_TDB			
S196	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S197	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S198	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S199	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S200	56	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S201	14131	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S202	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S203	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S204	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S205	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S206	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S207	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S208	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S209	33	S201 and S202	US-PGPUB;	OR	OFF	2012/09/14

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			12:25
S210	172	S201 and S203	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S211	217	S201 and S204	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S212	348	S201 and S205	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S213	176	S201 and S206	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S214	9	S201 and S207	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S215	8	S201 and S208	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S216	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S217	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S218	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S219	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" |	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25

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S221	14131	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S222	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S223	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S224	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S225	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S226	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S227	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S228	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S229	33	S221 and S222	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S230	172	S221 and S223	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S231	217	S221 and S224	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S232	348	S221 and S225	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT;	OR	OFF	2012/09/14 12:25

			IBM_TDB			
S233	176	S221 and S226	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S234	9	S221 and S227	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S235	8	S221 and S228	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S236	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S237	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S238	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S239	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S240	56	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S241	14131	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25

Solventum-Exhibit 1013-1010

S242	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S243	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S244	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S245	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S246	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S247	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S248	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S249	33	S241 and S242	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S250	172	S241 and S243	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S251	217	S241 and S244	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S252	348	S241 and S245	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S253	176	S241 and S246	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S254	9	S241 and S247	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S255	8	S241 and S248	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S256	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25

S257	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S258	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S259	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
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S262	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S263	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S264	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S265	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S266	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S267	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S268	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S269	33	S261 and S262	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S270	172	S261 and S263	US-PGPUB;	OR	OFF	2012/09/14

			USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB			12:25
S271	217	S261 and S264	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S272	348	S261 and S265	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S273	176	S261 and S266	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S274	9	S261 and S267	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S275	8	S261 and S268	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S276	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S277	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S278	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S279	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" |	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25

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S282	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S283	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S284	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S285	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S286	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S287	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S288	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S289	33	S281 and S282	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S290	172	S281 and S283	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S291	217	S281 and S284	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S292	348	S281 and S285	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S293	176	S281 and S286	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25

S294	9	S281 and S287	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S295	8	S281 and S288	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S296	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S297	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S298	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S299	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
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S302	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S303	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S304	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S305	2276	(604/317-323).CCLS.	US-PGPUB;	OR	OFF	2012/09/14

			USPAT			12:25
S306	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S307	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S308	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S309	33	S301 and S302	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S310	172	S301 and S303	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S311	217	S301 and S304	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S312	348	S301 and S305	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S313	176	S301 and S306	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S314	9	S301 and S307	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S315	8	S301 and S308	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S316	119	("1251258" | "3171410" | "3486504").PN. OR ("3874387").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S317	210	("3026874" | "3486504" | "4540412" | "4759354" | "4969880").PN. OR ("5149331").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S318	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S319	288	("1355846" | "2547758" | "2632443" |	US-PGPUB;	OR	OFF	2012/09/14

		"2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	USPAT; USOCR			12:25
S320	56	((CARMELI) near2 (ADAHAN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S321	14131	wound and (suction vacuum) and (enclosure dressing) and ((bleeding hole) (vacuum breaker))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S322	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S323	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S324	371	(604/313).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S325	2276	(604/317-323).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S326	1612	(604/540-544).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S327	255	(604/902).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S328	579	(606/131).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S329	33	S321 and S322	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S330	172	S321 and S323	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S331	217	S321 and S324	US-PGPUB; USPAT; USOCR;	OR	OFF	2012/09/14 12:25

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S332	348	S321 and S325	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S333	176	S321 and S326	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S334	9	S321 and S327	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S335	8	S321 and S328	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
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S338	147	("4743232" | "5230350").PN. OR ("5344415").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
S339	288	("1355846" | "2547758" | "2632443" | "2682873" | "2969057" | "3367332" | "3648692" | "3682180" | "3826254" | "4080970" | "4096853" | "4139004" | "4165748" | "4245630" | "4261363" | "4275721" | "4297995" | "4333468" | "4373519" | "4382441" | "4392853" | "4392858" | "4419097" | "4475909" | "4480638" | "4525166" | "4525374" | "4540412" | "4543100" | "4551139" | "4569348" | "4605399" | "4608041" | "4640688" | "4655754" | "4733659" | "4743232" | "4787888" | "4826949" | "4838883" | "4840187" | "4863449" | "4872450" | "4878901" | "4897081" | "4906233" | "4906240" | "4919654" | "4941882" | "4953565" | "4969880" | "4985019" | "5037397" | "5100396" | "5149331" | "5167613" | "5176663" | "5261893" | "5298015" | "5344415" | "5358494" | "5556375" | "5607388" | "5636643" | "5645081").PN. OR ("6071267").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/14 12:25
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			USOCR; EPO; JPO; DERWENT; IBM_TDB			
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S342	19	S278 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S343	53	S279 and (vent venting ventillation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S344	73	"4108574" "4208171"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
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S346	6	S344 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S347	6	"20040015042" "20050180868"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S348	63	"4552552"	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S349	33	S348 and (vent venting)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S350	0	S348 and (air adj hole)	US-PGPUB; USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/09/14 12:25
S351	21	"5116206" "7503910"	US-PGPUB; USPAT; EPO;	OR	OFF	2012/09/14 12:25

			DERWENT; IBM_TDB			
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S353	879	(604/305-308).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25
S354	959	(604/35).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/09/14 12:25

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L81	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2013/04/03 13:34
L175	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2013/04/03 13:35
L353	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2013/04/03 13:35
L354	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and	US-PGPUB	OR	OFF	2013/04/03 13:35

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		medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.				
L355	0	enclosure and applying and negative and pressure and wound and attachable and circumference and confined and volume and tube and outlet and connectable and vacuum and source and venting and arrangement and calibrated and orifice and restrict and flow and ambient and air.clm.	USPAT; UPAD	OR	OFF	2013/04/03 13:35
L356	1	enclosure and applying and negative and pressure and wound and attachable and circumference and confined and volume and tube and outlet and connectable and vacuum and source and venting and arrangement and calibrated and orifice and restrict and flow and ambient and air.clm.	US-PGPUB	OR	OFF	2013/04/03 13:35
S81	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2011/04/15 13:00
S177	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2011/09/26 13:57
S355	0	pressure and regulating and device and sealed and vial and wheath and cap and connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.	US-PGPUB	OR	OFF	2012/09/14 12:25
S356	0	pressure and regulating and device and sealed and vial and wheath and cap and	US-PGPUB	OR	OFF	2012/09/14 12:25

		connector and positioned and within and bag and interior and surface and outer and adapted and expanded and unfolded and compensat and changes and volume and medical and fluid and move and first and orientation and portion and partially and unexpanded and folded and second and lubricant and layer and impermeable and impeding and passage and between and regulates and withdrawn and equilibrate and opposite and reduces and friction.clm.				
S357	0	enclosure and applying and negative and pressure and wound and attachable and circumference and confined and volume and tube and outlet and connectable and vacuum and source and venting and arrangement and calibrated and orifice and restrict and flow and ambient and air.clm.	USPAT; UPAD	OR	OFF	2012/09/14 12:30
S358	1	enclosure and applying and negative and pressure and wound and attachable and circumference and confined and volume and tube and outlet and connectable and vacuum and source and venting and arrangement and calibrated and orifice and restrict and flow and ambient and air.clm.	US-PGPUB	OR	OFF	2012/09/14 12:30

4/3/2013 1:44:45 PM
C:\Users\itreyger\Documents\EAST\Workspaces\11989297.wsp

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BIB DATA SHEET

CONFIRMATION NO. 4766

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/989,297	01/24/2008	604	3761	29068U

APPLICANTS
Carmeli Adahan, Jerusalem, ISRAEL;

**** CONTINUING DATA ************************* I.T. 06/22/2010**
This application is a 371 of PCT/IL2005/000784 07/24/2005

**** FOREIGN APPLICATIONS ************************* I.T. 06/22/2010**

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
07/08/2009

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /ILYA Y TREYGER/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		ISRAEL	2	33	5

ADDRESS

THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314
UNITED STATES

TITLE

Wound closure and drainage system

FILING FEE RECEIVED		
1000	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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11989297	ADAHAN, CARMELI
	Examiner	Art Unit
	ILYA Y TREYGER	3761

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
604	540-544	10/5/2010	I. T.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search attached	10/5/2010	I. T.
Search updated	4/15/2011	I. T.
Search updated	9/26/2011	I. T.
Search updated	5/22/2012	I. T.
Search updated	9/14/2012	I. T.
Search updated	4/3/2013	I. T.

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
604	540-544	9/14/2012	I. T.
	PGPUB Searched	9/14/2012	I. T.
	All updated	4/3/2013	I. T.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11989297
Filing Date	2008-01-24
First Named Inventor	Carmeli ADAHAN
Art Unit	3761
Examiner Name	ILYA Y. TREYGER
Attorney Docket Number	ADAHAN=16

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	5578006	A	1996-11-26	STEVENS	
	2	6817996	B2	2004-11-16	FARD et al.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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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	20050148913	A1	2005-07-07	WESTON	

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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	240188	RU		1947-11-03			☒
	2	9748427	WO	A2	1997-12-24	C.R. BARD INC.		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11989297
Filing Date	2008-01-24
First Named Inventor	Carmeli ADAHAN
Art Unit	3761
Examiner Name	ILYA Y. TREYGER
Attorney Docket Number	ADAHAN=16

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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]
	1	Worth et al., "PRELIMINARY REPORT The Effectiveness of Bacterial Filtration In Vented Wound Drains" Journal of Surgical Research 27(6):405-407 (1979)	☐
	2	Levite et al., "POSSIBILITIES FOR DUAL-LUMEN DRAINAGES IN SURGERY" Body of the RSFSR Ministry of Public Health, Monthly Scientific and Practical Journal, pages 39-41. (1987)	☐
	3	Notice of opposition to European patent EP2127690, dated March 20, 2013	☐
	4	Facts and Submissions in Opposition of EP 2127690, dated March 20, 2013	☐
	5	Edlich et al., "Evaluation of a New, Improved Surgical Drainage System" NEW INSTRUMENTS, 149:295-298 (February 1985)	☐
	6	Communication of a notice of opposition of EP 2127690, dated April 8, 2013	☐

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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	11989297
Filing Date	2008-01-24
First Named Inventor	Carmeli ADAHAN
Art Unit	3761
Examiner Name	ILYA Y. TREYGER
Attorney Docket Number	ADAHAN=16

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.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

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	/rlb/	Date (YYYY-MM-DD)	2013-04-30
Name/Print	Roger L. Browdy	Registration Number	25,618

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

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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).

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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.

Translation of description / claims of RU 240188

WOUND OR BLISTER DRESSING DEVICE

[column 1]

The known wound or blister dressing devices that contain a cylindrical aspiration handpiece tip that is connected to the rarefaction source are intended for sucking out various liquids and do not provide for the mechanical separation of tissues with simultaneous removal of the failing tissues.

The proposed device differs in that the aspiration handpiece tip is equipped with an air suction valve and the working edge of the aspirator is situated in a single plane. This makes it possible to perform evacuation, the mechanical separation of tissues and the simultaneous removal of the failing tissues and traumatic discharge.

Furthermore, in order to ensure more aggressive ablation of pathologically changed tissues, the end of the aspiration handpiece tip can have a sharp cutting edge full-circle or in its arc.

The end of the aspiration handpiece tip may be designed to be blunt, e.g., by polishing or flaring, which ensures prevailing tissue evacuation alongside with attenuated mechanical processing.

Shown on Figure 1 is the wound or blister dressing device discussed herein, in two projections: Figure 2 shows the aspiration handpiece tip.

The device includes a cylindrical aspiration handset *1*, which

[column 2]

uses a hose system *2* and intermediate vessels *3* and *4*, is connected to a vacuum pump *5*. The device is equipped with a movable table *6* and a control panel *7* with measurement instruments. The vessel *3* is half-filled with water and acts as a water filter, while the vessel *4* is intended to receive the traumatic discharge. Furthermore, the device has a fabric filter *8* and an oil filter *9*. The aspiration handpiece tip is equipped with an air suction valve *10*, and the working edge of the aspirator is situated in a single plane.

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The device package includes a number of types of removable aspiration handpiece tips *1*, which are used depending on the purpose of the surgery.

If necessary, in order to ensure more aggressive ablation of pathologically changed tissues, the end of the aspiration handset is designed with a sharp cutting edge full-circle or in its arc. In order to ensure prevailing evacuation of tissues alongside with their attenuated mechanical processing, an aspiration handset is used with a sharp (polished or flared) end.

Subject of Invention

1. A wound or blister dressing device comprising a cylindrical aspiration

[column 3]

handpiece tip that can be connected to the rarefaction source, *characterized by* the fact that in order to ensure evacuation, mechanical ablation of tissues and simultaneous removal of the failing tissues and traumatic discharge, the aspiration handset tip is equipped with an air suction valve, and the working edge of the aspirator is situated in a single plane.

2. The device discussed in paragraph 1 *is characterized* by the fact that in order to ensure more aggressive ablation

[column 4]

of pathologically changed tissues, the end of the aspiration handpiece tip has a sharp cutting edge full-circle or in its arc.

3. The device discussed in paragraph 1 is *characterized by* the fact that in order to ensure prevailing evacuation of tissues alongside with their attenuated mechanical processing, the aspiration handset is designed to be blunt, e.g., polished or flared.

Solventum-Exhibit 1013-1030

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Заявитель —

УСТРОЙСТВО ДЛЯ ОБРАБОТКИ РАН ИЛИ ЯЗВ

1

Известные устройства для обработки ран или язв, содержащие цилиндрический наконечник-аспиратор, подключаемый к источнику разрежения, предназначены для отсоса различных жидкостей и не предусматривают возможности механического отслоения тканей с одновременным удалением, отторгаемых тканей.

Предлагаемое устройство отличается тем, что наконечник-аспиратор снабжен клапаном подсоса воздуха, а рабочая кромка аспиратора расположена в одной плоскости. Это позволяет осуществлять вакуумирование, механическое отслоение тканей и одновременное удаление отторгаемых тканей и раневого отделяемого.

Кроме того, для более активного отторжения патологически измененных тканей торец наконечника-аспиратора может иметь острый режущий край по окружности или по ее дуге.

Торец наконечника-аспиратора может быть выполнен тупым, например, путем шлифовки или развальцовки, что обеспечивает преобладающее вакуумирование тканей при щадящей механической обработке.

На фиг. 1 изображено описываемое устройство для обработки ран или язв, в двух проекциях; на фиг. 2 — наконечник-аспиратор.

Устройство содержит цилиндрический наконечник-аспиратор *1*, который с помощью

2

системы шлангов *2* и промежуточных емкостей *3* и *4* подключен к вакуум-насосу *5*. Устройство снабжено передвижным столиком *6* и щитом управления *7* с контрольно-измерительными приборами. Емкость *3* залита наполовину водой и выполняет роль водяного фильтра, а емкость *4* предназначена для приема раневого отделяемого. Кроме того, в устройстве имеются марлевый *8* и масляный *9* фильтры. Наконечник-аспиратор снабжен клапаном *10* подсоса воздуха, а рабочая кромка аспиратора расположена в одной плоскости.

В комплект устройства входит несколько различных типов съемных наконечников-аспираторов *1*, применяемых в зависимости от цели операции.

При необходимости более активного отторжения патологически измененных тканей торец наконечника-аспиратора выполняется с острым режущим краем по окружности или по ее дуге. Для преобладающего вакуумирования тканей при щадящей механической обработке применяется наконечник-аспиратор с тупым (отшлифованным или развальцованным) торцом.

Предмет изобретения

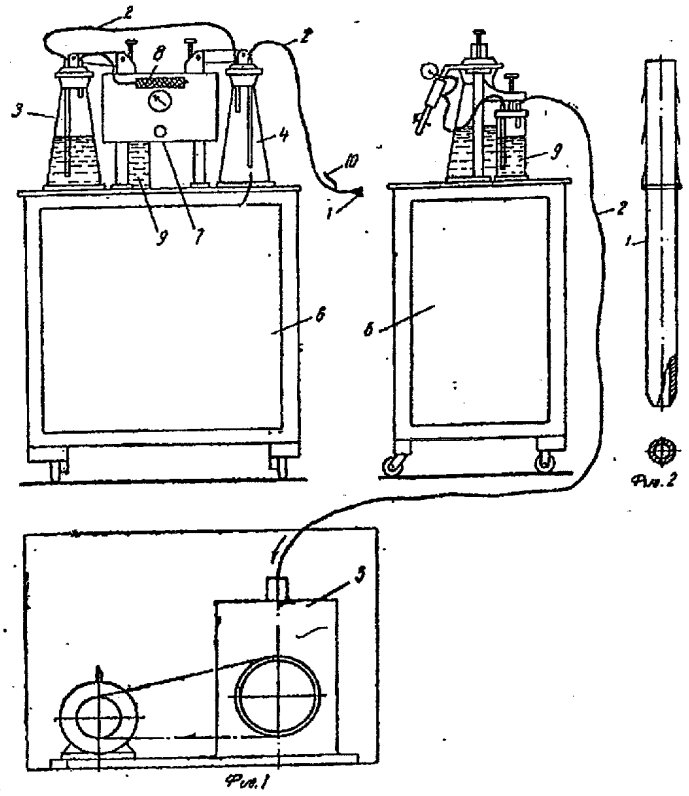
1. Устройство для обработки ран или язв, содержащее цилиндрический наконечник-ас-

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пиратор, подключаемый к источнику разрежения, *отличающееся* тем, что, с целью вакуумирования, механического отслоения тканей и одновременного удаления отторгаемых тканей и раневого отделяемого, наконечник-аспиратор снабжен клапаном подсоса воздуха, а рабочая кромка аспиратора расположена в одной плоскости.

2. Устройство по п. 1, *отличающееся* тем, что, с целью более активного отторжения патологических измененных тканей, торец наконечника-аспиратора имеет острый режущий край по окружности или по ее дуге.

3. Устройство по п. 1, *отличающееся* тем, что, с целью преобладающего вакуумирования тканей при щадящей механической обработке, торец наконечника-аспиратора выполнен тупым, например, отшлифован или имеет развальцовку.



Фиг. 2

Фиг. 1

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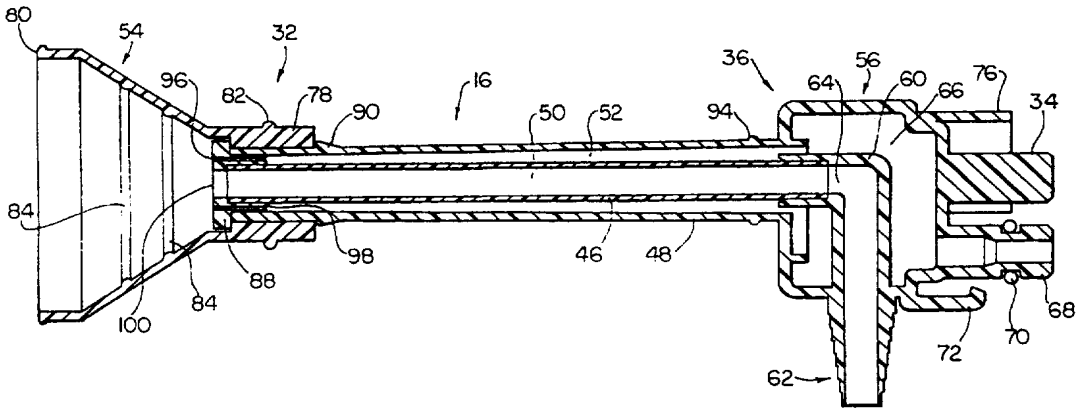
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(57) Abstract

A medical suction and irrigation apparatus includes a suction/irrigation tip removably connected to a conventional suction/irrigation handpiece. Suction is provided through a suction tube which has a bypass conduit in the tip. The bypass conduit is directly connectable to a suction source so that aspirated debris passes through the tip to the suction source. The suction tube thus prevents aspirated debris from entering the conventional suction tube in the handpiece and contaminating the handpiece. The suction tube is also designed to have a maximum size to prevent the tip from clogging. The tip also has an irrigation tube for directing irrigation liquid to the irrigation site, and a connector which connects the irrigation tube to the handpiece so that the handpiece pumps fluid through the tip in a conventional manner. A flexible splash shield, slidably mounted to the irrigation tube, confines irrigation fluid to the local site.

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SUCTION AND IRRIGATION HANDPIECE AND TIP

Field of the Invention

This invention relates generally to medical irrigation systems and, more particularly, to hand-held medical irrigation devices that have a tip with suction and irrigation channels.

Background of the Invention

Irrigation devices are in common use in a variety of non-surgical environments, such as nursing homes and other long-term care facilities, where they are used to treat bed sores and other injuries that are accessible externally about a patient. These devices generally comprise an irrigation handpiece and accompanying irrigation tip that direct irrigation liquid from an irrigation source to an irrigation site. Effective treatment often requires that the injured site be irrigated several times.

Conventional irrigation and suction devices have a combination suction and irrigation tip that can be detachably connected to a handpiece having both irrigation and suction lumens. The free end of the tip has a conical splash shield that, during use, is pressed against and about the irrigated region to confine irrigation liquid (e.g., saline) to that region. A typical tip is shown in U.S. Patent No. 4,692,140 (Olson). The Olson tip has an outer (suction) tube, an inner (irrigation) tube coaxially aligned with the suction tube, and a web (referred to as "pegs" in Olson) that supports the distal end of the irrigation tube within the suction tube. The annular space between the tubes provides a suction pathway for biological debris aspirated from the irrigation site. Aspirated biological debris is drawn through the suction pathway to the suction lumen in the handpiece, from which it flows through a connecting tube to a debris collection chamber.

One problem with such devices is that the biological debris ingested into the handpiece suction lumen (from the irrigation site) may contain infectious bacteria that could contaminate the handpiece. The handpiece can thus become septic and may create an undesirable risk of reinfection to the patient if it is reused. Accordingly, although irrigation handpieces with detachable tips are available, there has been a resistance to their use because the handpieces are relatively expensive and can only be used once. The preferred treatment is to to bathe the patient in a warm whirlpool bath instead of locally irrigating the injury with an irrigation handpiece and tip. This alternative treatment method is inefficient, however, since it is time consuming and treats both injured and uninjured parts of the patient's body.

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Another difficulty with the foregoing coaxial tip is that the suction pathway can clog easily with aspirated biological debris because it has a relatively small cross-sectional dimension. The web also appears to further obstruct debris drawn toward the annular suction pathway since it partially covers the open distal end of the pathway.

A flexible splash shield that is permanently fastened to the distal end of the outer suction tube also presents problems. More particularly, when the irrigation tip must be positioned very close to the irrigation site, it may be necessary to cut off the end of the shield along one of several circumferential ring guides. In addition to being time consuming and cumbersome, the structure of the tip is permanently altered. A new tip must be used to irrigate a larger local injury site.

In addition, it is common during use for irrigation fluid and biological debris to escape from the splash shield because, for example, the irrigation surface may not be smooth or the attendant may inadvertently move the handpiece while irrigating. This can cause the debris and irrigation liquid to splash onto the handpiece and/or attendant, consequently contaminating the handpiece and exposing the attendant to infection.

It therefore is among the general objects of the invention to provide an improved suction/irrigation tip that avoids contamination of the handpiece.

Summary of the Invention

In accordance with one aspect of the invention, the suction lumen in a detachable suction and irrigation tip is configured so that aspirated fluid and debris are passed directly to an external suction source when the tip is used with a conventional handpiece having both suction and irrigation lumens. No portion of the suction lumen in the tip is in fluid communication with the suction lumen in the handpiece. However, the irrigation lumen in the handpiece is in fluid communication with the irrigation lumen in the tip so that irrigation can pass through the handpiece and tip in normal fashion.

In accordance with another aspect of the invention, the suction and irrigation lumens in the tip are arranged coaxially with the inner tube defining the suction lumen and the annular lumen between the inner and outer tubes defining the irrigation lumen. The annular lumen terminates in an annular end wall that includes a number of circumferentially spaced outlet apertures through which irrigation liquid is emitted. Since the cross-sectional dimension of the

suction lumen is greater than the radial dimension of the surrounding annular lumen, the risk of that lumen being clogged by debris is reduced.

In accordance with yet another aspect of the invention, a flexible splash shield is slidably mounted on the tip. This enables the distal end of the suction and irrigation tubes to be positioned directly against the irrigation site without having to cut the shield.

In accordance with still another aspect of the invention, the tip is provided with a protective covering having one end that is heat sealed to the tip and another end that is open. When the tip is connected to a handpiece, the covering is sized to fit loosely about the handpiece and may extend past the bottom of the handpiece. The covering protects the handpiece and the attendant from debris that may splash from the irrigation site.

It is among the objects of the invention to provide combination suction and irrigation tip that it detachably connectible to a handpiece and in which biological debris aspirated through the suction lumen bypasses the handpiece.

Another object of the invention is to provide an improved combination suction and irrigation tip that may be detachably connected to an irrigation handpiece in which the risk of the handpiece becoming contaminated with biological debris is reduced.

Brief Description of the Drawings

The foregoing and other objects and advantages of the invention will be appreciated more fully from the following further description thereof with reference to the accompanying drawings wherein:

Figure 1 is a perspective view of the irrigation system in accordance with the invention;

Figure 2 is a perspective view of the suction irrigation tip with the splash shield retracted;

Figure 3 is a longitudinal cross section of the suction irrigation tip along line 3-3 of Figure 1;

Figure 4 is a perspective view of the suction irrigation tip showing the rear and side components of the tip;

Figure 5 is a bottom perspective view of the rear portion of the suction irrigation tip;

Figure 6 is a front perspective view of the suction irrigation tip;

Figure 7 is a perspective view of the suction irrigation tip and handpiece with the polymeric envelope extending just past the bottom of the handpiece; and

Figure 8 is a perspective view of the suction irrigation tip and handpiece with the polymeric envelope extending to the attendant's elbow.

Description of the Illustrative Embodiment

Figure 1 illustrates the main components of the suction and irrigation system, which includes a conventional handpiece 10 connected to a reservoir bag 12 by flexible irrigation tubing 14, and a combination suction and irrigation tip 16 detachably connectible to the handpiece 10. Such a handpiece may also include a suction tube 19 extending into the interior of the handpiece 10 which can be connected to a suction source 18 (e.g., wall suction) to aspirate debris. As described in detail below, when the inventive tip 16 is connected to the handpiece 10, a suction bypass is provided that diverts aspirated debris away from the interior of the handpiece 10, thus reducing the risk of contaminating the handpiece 10. Irrigation fluid (e.g., saline) is provided by the bag 12, from which it is pumped through the handpiece 10 and tip 16, to the irrigation site.

The handpiece 10 may be a Simpulse Solo™ suction irrigator (available from C.R. Bard, Inc. of Murray Hill, N.J.) which has a self contained pump, battery, and motor, (omitted for clarity) such as that described in more detail in co-pending U.S. patent application No. 08/389,155, assigned to C.R. Bard, Inc. A suction lumen 22 and an irrigation lumen 24, shown in phantom, extend through the entire length of the handpiece. The suction lumen 22 is connectible to the suction source 18 at one end and terminates at a suction port 28 at the other end. The irrigation lumen 24 is connectible to the irrigation source 12 at one end and terminates at an irrigation port 30 at the other end. Both ports 28 and 30 are formed through a fitting 26 at the distal end of the handpiece 10.

In accordance with principles of the invention, a special tip (i.e. tip 16) is provided for use with the conventional handpiece 10. The proximal end of the tip 16 is configured to detachably mate with the fitting 26. When the tip 16 is connected to the handpiece 10 and the handpiece 10 is energized (by squeezing a trigger 31), irrigation fluid passes through the irrigation port 30 and into the tip 16. The irrigation fluid is emitted in a pulsatile liquid stream from the distal end 32 of the tip at a pulsating frequency that is controllable by the trigger 31. However, the suction port 28 is plugged by a plug 34 extending from the tip proximal end 36. When the tip 16 is not connected to the handpiece 10, a plug 38 having two projections 40, 44

preferably is inserted into the ports 28 and 30 to prevent entry of contaminants into the handpiece.

The tip 16, illustrated in cross section in FIG. 3, may be made from a hard, substantially transparent plastic. The tip 16 includes an inner (suction) tube 46 coaxially aligned within an outer (irrigation) tube 48, a flexible, funnel-shaped splash shield 54, and a connector 56. The suction tube 46 provides a direct pathway 50 for suction from the tip distal end 32 to a suction source (schematically illustrated as source 18 in Figure 1). Aspirated debris therefore never enters the handpiece 10. The annular space 52 between the suction and irrigation tubes 46 and 48 provides a pathway for irrigation fluid. The splash shield 54, slidably mounted to the irrigation tube 48, enables treatment to be confined to a localized treatment site. The connector 56 at the tip proximal end 36 removably connects the tip 16 to the handpiece 10.

The suction tube 46 is supported within the irrigation tube 48 at one end by an outlet nozzle 58, and at the other end by an elbow shaped conduit 60. The outlet nozzle 58 is in the form of a plurality of circumferentially spaced openings formed in an annular end wall. The elbow shaped conduit 60 extends into and downwardly through the connector 56, terminating at a tapered lower end 62 having a plurality of annular ridges 63 (figure 5). The suction tube 46 is sealed to both the outlet nozzle 58 and elbow-shaped conduit 60 to form a continuous suction lumen 64 from the tip distal end 32 to the tapered lower end 62 of the elbow 60 to which the suction tubing 20 from a suction source may be connected.

Although the elbow shaped conduit 60 is shown as extending from the proximal end of the suction tube 46, it may depend from any part of the suction tube 46. In an alternative embodiment, for example, the suction tube 46 is about half the size as it is in the preferred embodiment and the elbow shaped conduit 60 may connect to the suction tube 46 within the irrigation tube 48. The tapered end 62 of the elbow shaped conduit 60 extends through a wall of the irrigation tube 48 for connection with the flexible suction tubing 20.

The connector 56 has an irrigation fluid chamber 66 that receives fluid from the handpiece irrigation port 30 through an irrigation connector 68. After the fluid is received in the fluid chamber 66, the fluid chamber 66 directs it to the annular space 52, which then directs it through the outlet nozzle 58. An O-ring 70 may encircle the irrigation connector 68 to seal the connection between the irrigation connector 68 and the irrigation port 30 on the handpiece. A flexible clip 72 may be molded integrally with the connector 56 for engagement with a lip 74 formed along the underside of the handpiece fitting 26.

As shown in figures 4 and 5, a hood 76 extends proximally from the connector 56 to shield the suction and irrigation ports 28 and 30 from irrigation fluid and debris that, in use, may splash back toward the handpiece 10. The hood 76 preferably has a partially oblong shape, approximating the shape of the handpiece fitting 26. It extends downwardly about the tip plug 34 and partially about the irrigation connector 68. When the tip 16 is connected to the handpiece 10, the hood 76 covers the top portion of the fitting 26, thus further reducing the risk of splashed fluids contaminating the ports 28 and 30. The rounded top of the hood 76 causes fluids to drip past the sides of the nozzle 26.

The flexible shield 54 includes a proximal collar 78 and a conical body that diverges in a distal direction to a distal rim 80. The collar 78 is slidably mounted to the irrigation tube 48 and has an annular gripping ridge 82 to facilitate gripping the collar 78. A plurality of circumferential ridges 84 (e.g., three) may be included on the inner surface of the shield 54 to serve as cutting guides for cutting shield 54. Vent holes 86 formed in the side of the shield 54 prevent the shield 54 from collapsing under suction and also enable air to mix with the debris aspirated from the site to avoid stagnation of the debris within the shield 54. The shield 54 may be made from a flexible, substantially clear plastic that may be shaped during use to conform to the shape and contour of the irrigation site.

The collar 78 may be secured to the distal end of the tip 16 by both an annular flange 88 (shown in figures 2 and 3) and a discontinuous circumferential ridge 90 formed on the irrigation tube 48. The ridge 90 has two discontinuities 92 that enable the shield 54 to be easily forced over the securing ridge 90. The shield 54 may be retracted proximally (FIG 2), over the securing ridge 90, by applying a proximal force to either the rim 54 or to the gripping ridge on the collar 78. The irrigation tube 48 may be tapered slightly toward the tip distal end 32 to increase the resistance to proximally retracting the shield 54. A stop ridge 94 may circumscribe the proximal end of the irrigation tube 48 to prevent the splash shield 54 from being retracted into contact with the connector 56.

The shower head nozzle 58 is fastened to the tip distal end 32 and includes an end wall 97 and a cylindrical wall 98 extending proximally from the end wall. The nozzle 58 serves a number of important functions. In addition to partially securing the splash shield 54 to the tip 16 and securing the suction tube 46 coaxially within the irrigation tube 48, it can be configured to emit irrigation fluid from the tip 16 in a specialized spray pattern. To that end, the shower head nozzle 58 has a plurality of irrigation holes 96 (e.g., nine) longitudinally formed through the

cylindrical wall 98 and end wall 97, and a central suction hole 100. The diameter of the central suction hole 100 should have approximately the same diameter as the inner diameter of the suction tube 46 such as, for example, 0.1875 inches. The number, shape, and size of the irrigation holes 96 are selected both to provide a specialized spray pattern for the irrigation fluid and to regulate the force with which the irrigation fluid is emitted from the tip 16. Accordingly, the suction/irrigation tip 16 may be customized to be usable with certain handpieces only. For example, when irrigating an externally exposed wound (e.g., a bed sore), it is preferred that the irrigation fluid be emitted from the tip 16 at a force not exceeding 15 p.s.i.. When the tip 16 is used with the Simpulse Solo™ suction irrigation handpiece, nine round holes having a diameter of 0.040 inches have produced satisfactory results. Similarly, when used with the Simpulse Plus™ suction irrigation handpiece, also available from C.R. Bard, Inc., four round holes having a diameter of 0.040 inches have produced satisfactory results.

During the irrigation procedure, it therefore is important that the attendant easily select the tip 16 that corresponds with a specific handpiece 10. Accordingly, it is preferred that the tip 16 have a simple identification means that quickly and easily indicates the tip 16 that corresponds to the handpiece 10 being used. To that end, the tip connector 56 may be color coded to correlate with the handpiece 10. For example, the tip connector 56 to be used with the Simpulse Solo™ may be colored purple, while the tip connector 56 to be used with the Simpulse Plus ™ may be colored green. As a further means for ensuring proper tip use, the tip connector 56 may be specially shaped to mate only with the fitting 26 of the handpiece 10 with which it is to be used. Therefore, the wrong tip 16 cannot fit into the wrong pump/handpiece 10. To that end, either the irrigation connector 68 or the tip plug 34 may be provided with a ridge 101 (Fig. 4) or other irregularity, and the corresponding handpiece suction port 28 or irrigation port 30 may be molded to that complimentary shape. The connector 56 may only be connected to the corresponding port for a fluid tight fit.

Fig. 7 illustrates an arrangement by which the handpiece 10 is protected from irrigation fluid and other biological debris that may splash from the irrigation site during use. To that end, the tip 16 is provided with an protective covering 102 having one end 104 that is heat sealed to the connector 56 and another end 106 that is open. The protective covering 102 is sized to fit loosely about the handpiece 10. The length of the protective covering 102 preferably is long enough to extend to the bottom end of the handpiece 10. This ensures that the handpiece 10 will remain protected by the protective covering 102 even though the protective covering 102 might

shift somewhat relative to the handpiece 10. An elastic band may be connected about the protective covering open end 106 to provide a secure fit about the bottom end of the handpiece 10. The protective covering 102 is can be made from a thin, flexible, substantially transparent polymeric material, such as a low density polyethylene having a thickness of about 0.001 inch. It is dimensioned so that it will maintain a loose fit about the handpiece 10. The flexibility and transparent nature of the polymeric protective covering 102 enables the attendant to effectively operate all the controls on the handpiece 10 through the protective covering.

Fig. 8 shows a second arrangement by which both the handpiece 10 and attendant's arm are protected from debris that splashes from the site. To that end, the tip 16 is provided with a long protective covering 108 having one end 110 that is heat sealed to the connector 56 and another end 112 that is open. The long protective covering 108 is sized to fit loosely about the handpiece 10 so that the attendant may operate the handpiece 10 from within the long protective covering 108 The length of the protective covering 108 preferably is three times the length of the handpiece 10 so that the open end 112 will extend approximately to the attendant's elbow 114. This ensures that both the handpiece 10 and attendant's arm will be protected from debris that splashes from the site. The long protective covering 108 may be made from a thin, flexible, substantially transparent polymeric material, such as a low density polyethylene having a thickness of about 0.001 inch. It is dimensioned so that the attendant's hand will easily fit inside the protective covering 108 to operate the handpiece 10. The flexibility and transparent nature of the long protective covering 108 enables the attendant to effectively operate all the controls on the handpiece 10 from inside and outside the protective covering 108.

When in use, the tip 16 is connected to the handpiece 10 and the flexible suction tubing 20 is connected to the tapered lower end 62 of the elbow shaped conduit 60. The handpiece suction tube 22 remains unused. Since the tip 16 is connected to the handpiece 10, the tip plug 34 sealingly connects to the handpiece suction port 28 and the irrigation connector 68 connects to the handpiece irrigation port 30. The shield 54 may be positioned at the tip distal end 32 and the rim 80 may positioned at the local irrigation site. If desired, either of the flexible protective coverings 102 or 108 may be disposed over and about the handpiece 10. The user may then simultaneously irrigate and aspirate the site. The attendant may retract the shield 54 to put the shower head nozzle 58 directly against, or very close proximity to, the irrigated site. The large cross-sectional area of the suction tube 46 reduces the possibility of clogging. After use, the tip 16 and protective covering 102 or 108 are discarded and the two prong plug 38 is inserted into

the suction and irrigation ports 28, 30 to ensure that the handpiece 10 remains aseptic. The handpiece 10 may be reused at a later time by removing the two prong plug 38 and inserting a new suction irrigation tip 16.

It should be understood that the foregoing description of the invention is intended merely to be illustrative thereof and that other modifications and embodiments may be apparent to those skilled in the art without departing from its spirit.

CLAIMS

1. A detachable suction tip for use with a suction handpiece, the handpiece having an suction lumen extending therethrough for removing irrigation fluid from an irrigation site, the tip comprising:

a suction tube for aspirating irrigation fluid from the irrigation site, the suction tube having a fluid bypass path within the detachable tip which channels aspirated irrigation fluid directly to a suction source so that aspirated fluid within the suction tube does not communicate with the handpiece suction lumen; and

a connector for mechanically connecting the tip to the handpiece, the connector also having a plug for sealing the suction lumen in the handpiece.

2. A tip as defined in claim 1 further comprising an irrigation tube for directing the irrigation fluid to the irrigation site.

3. A tip as defined in claim 2 wherein the connector connects the irrigation tube to the handpiece irrigation lumen to provide fluid communication therebetween.

4. A tip as defined in claim 2 wherein the suction tube is within the irrigation tube.

5. A detachable suction and irrigation tip for use with an irrigation handpiece, the handpiece having a suction lumen and an irrigation lumen extending therethrough, the irrigation lumen directing irrigation fluid to an irrigation site, the tip comprising:

an irrigation tube for directing the irrigation fluid to the irrigation site;

a connector for detachably connecting the irrigation tube to the handpiece to provide fluid communication therebetween and for sealing the suction lumen in the handpiece; and

a suction tube for aspirating irrigation fluid from the irrigation site, the suction tube having a fluid bypass path within the detachable tip which channels aspirated irrigation fluid directly to a suction source so that aspirated fluid within the suction tube does not communicate with the handpiece.

6. The tip as defined by claim 5 wherein the connector has an adjacent chamber for directing the irrigation fluid to the irrigation tube and wherein the fluid bypass path passes through the chamber.

7. The tip as defined by claim 5 wherein the irrigation tube and suction tube are coaxially aligned.

8. The tip as defined by claim 5 wherein the suction tube is disposed in the irrigation tube.

9. The tip as defined by claim 8 wherein the fluid bypass path passes through the irrigation tube.

10. The tip as defined by claim 5 further including a splash shield slidably mounted on the tip.

11. The tip as defined by claim 5 further including a fluid deflecting hood extending from the connector to deflect splashed irrigation fluid away from the handpiece.

12. The tip as defined by claim 5 further including a protective covering fastened to the tip and covering the handpiece.

13. The tip as defined by claim 5 wherein the fluid bypass path terminates at an open end suitable for connection to a suction source.

14. The tip as defined by claim 5 wherein the suction tube has a tube segment that diverts aspirated fluid away from the distal end of the handpiece.

15. A method of irrigating an irrigation site, the method comprising the steps of:

(a) providing a handpiece defining a handpiece irrigation lumen and a handpiece suction lumen;

(b) connecting the handpiece irrigation lumen to an irrigation fluid source;

(c) detachably connecting a tip to the distal end of the handpiece, the tip having a tip irrigation tube in fluid communication with the handpiece irrigation lumen, a tip suction tube for aspirating fluid from the site and a bypass fluid path in fluid communication with the tip suction tube, and

(d) connecting the bypass fluid path to a suction source.

16. The method of irrigating the irrigation site as defined by claim 15 wherein step © comprises the step of plugging the handpiece suction lumen.

17. The method of irrigating the irrigation site as defined by claim 15 further comprising the steps of:

(e) removing the tip from the handpiece;

(f) inserting a plug in the handpiece suction lumen; and

(g) inserting a plug in the handpiece irrigation lumen.

18. The method of irrigating the irrigation site as defined by claim 15 further comprising the steps of:

(h) removing the plug from the handpiece suction lumen;

(i) removing the plug from the handpiece irrigation lumen; and

(j) connecting a second tip to the handpiece, the second tip having a tip irrigation tube, and a tip suction tube that prevents aspirated fluid from communicating with the handpiece suction lumen.

19. An apparatus for irrigating an irrigation site comprising:

a handpiece having an irrigation lumen extending therethrough; and

a tip comprising:

an irrigation tube;

a suction tube for aspirating fluid from the irrigation site; and

a connector for detachably connecting the irrigation tube to the handpiece;

the suction tube being in communication with a bypass fluid path contained within the tip, which bypass fluid path bypasses the handpiece to prevent the aspirated fluid within the suction tube from communicating with the interior of the handpiece.

20. The apparatus as defined by claim 19 wherein the connector comprises a connecting tube in fluid communication with the irrigation tube, and a connecting plug,

the connecting tube removably connecting the irrigation tube to the irrigation lumen in the handpiece, and the connecting plug sealing the suction lumen in the handpiece.

21. An apparatus for irrigating an irrigation site comprising:

a handpiece having a lower end;

a tip connected to the handpiece and having a proximal end; and

a flexible protective covering connected to the tip, the protective covering disposed about and surrounding the proximal end of the tip and the handpiece, the protective covering extending at least to the lower end of the handpiece.

22. The apparatus as defined by claim 21 wherein the protective covering has a length of approximately three times the length of the handpiece.

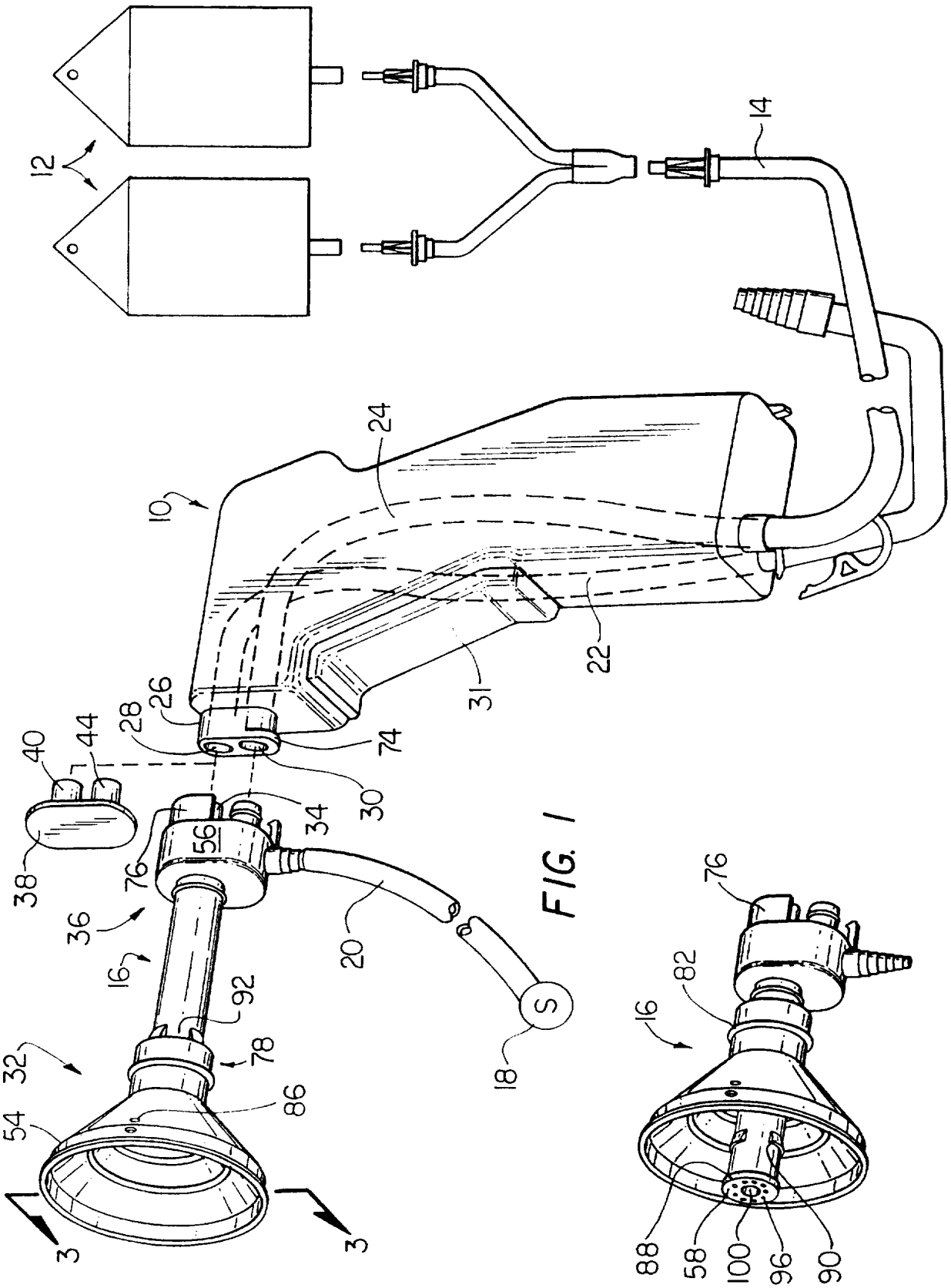


FIG. 1

FIG. 2

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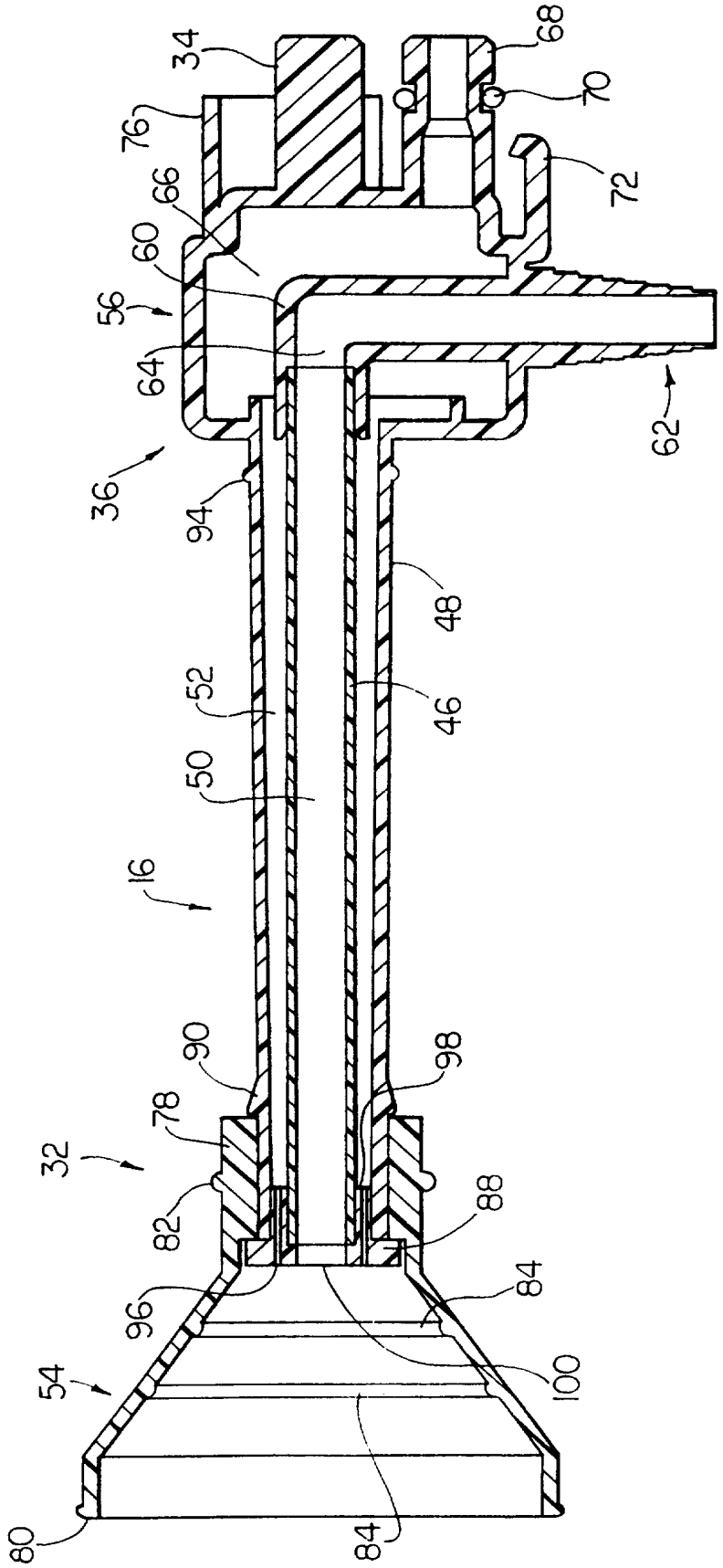


FIG. 3

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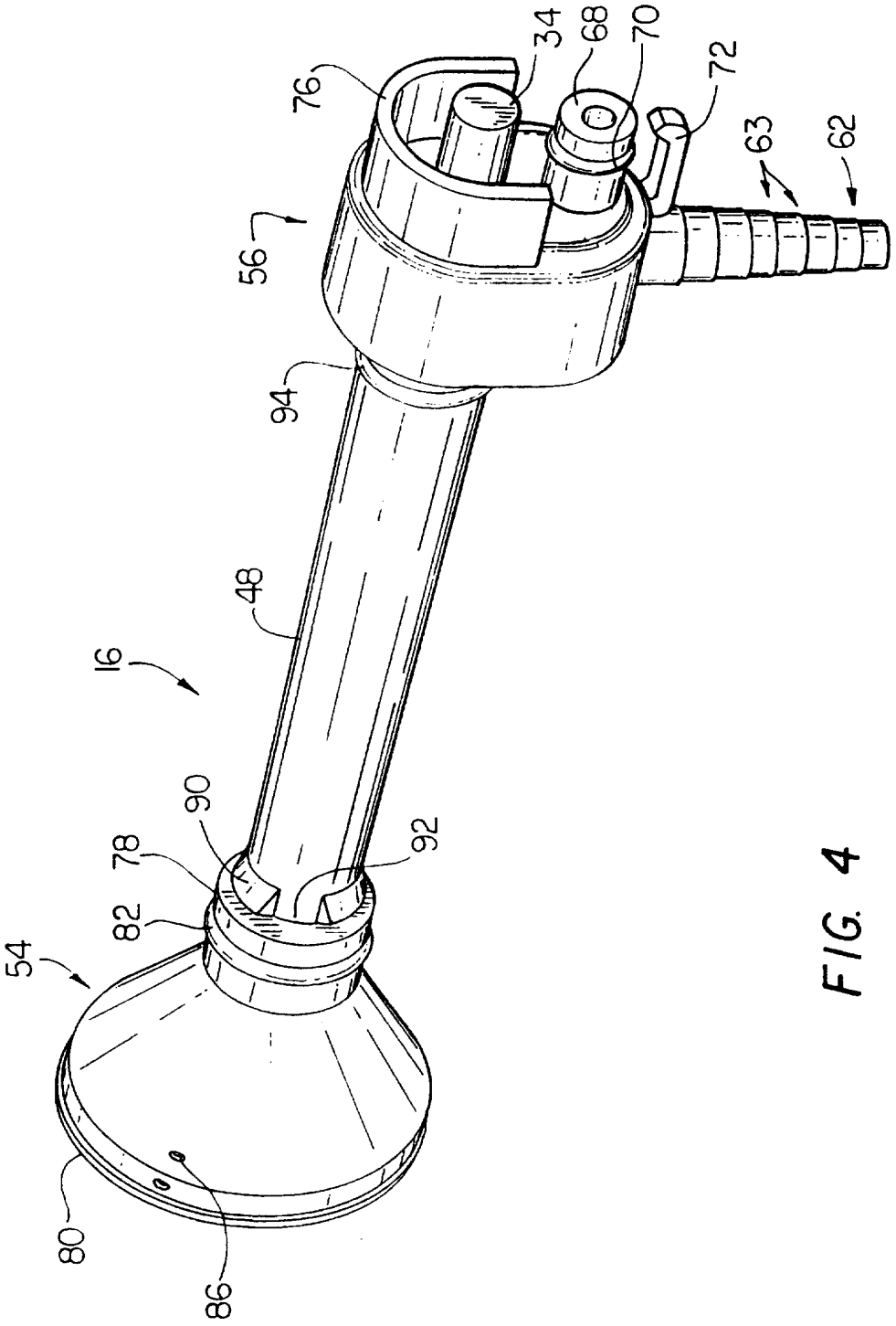


FIG. 4

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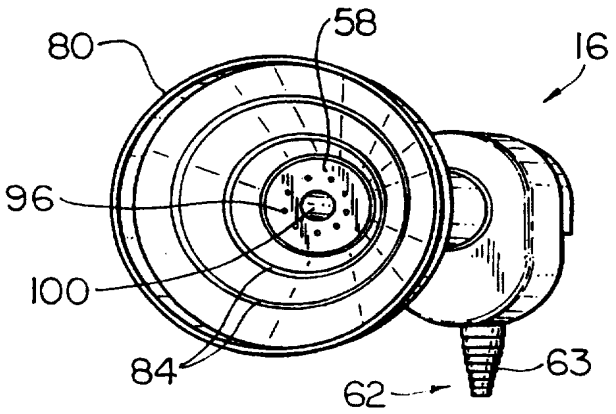


FIG. 6

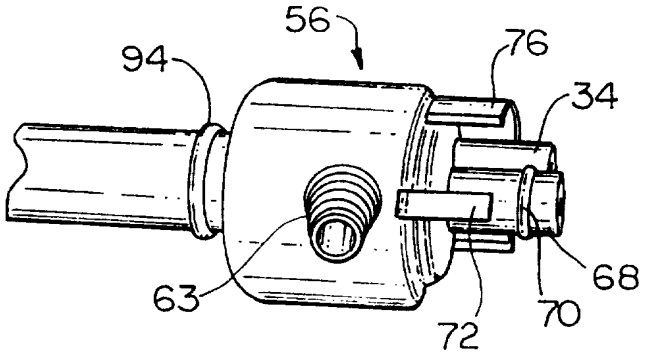


FIG. 5

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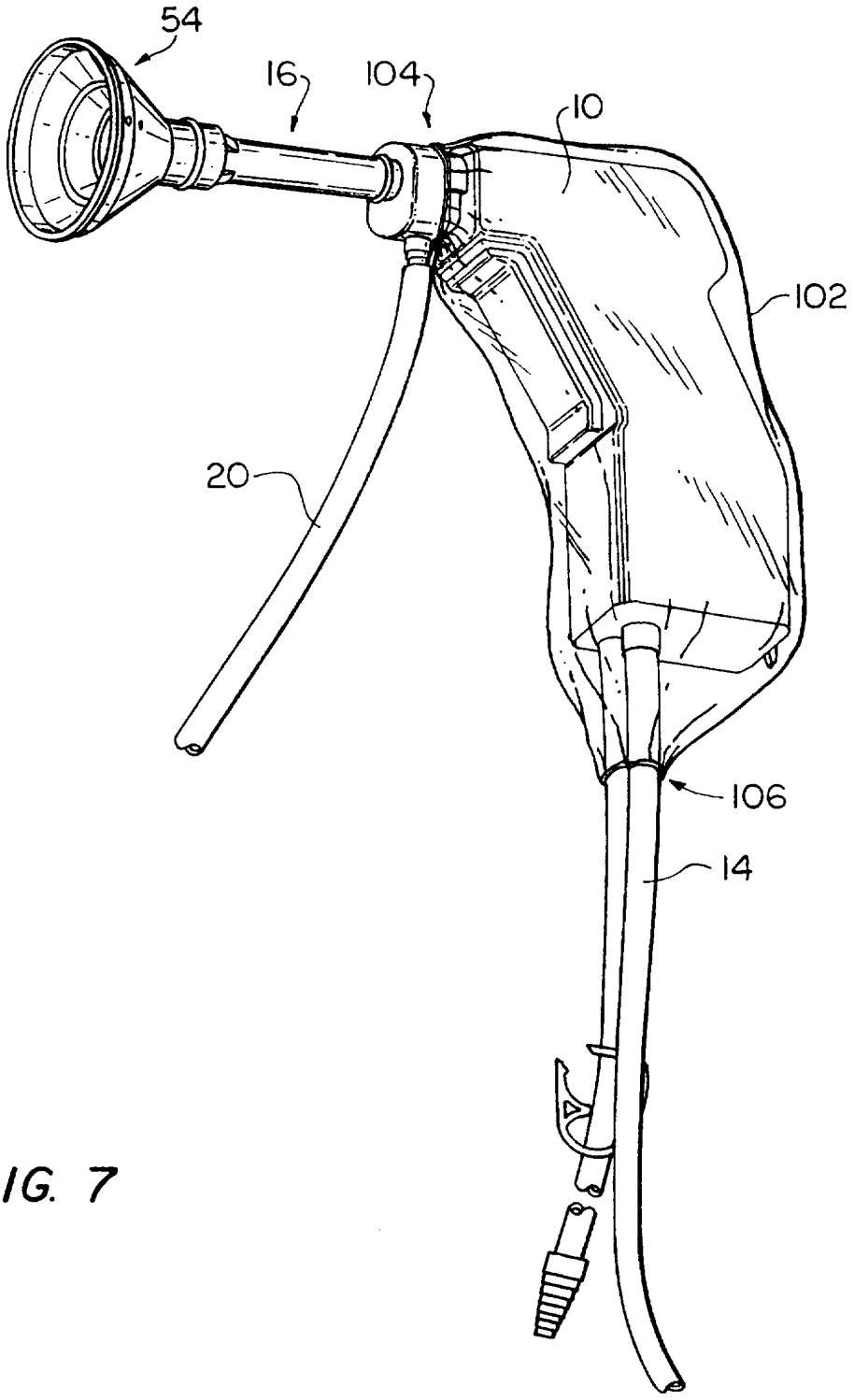


FIG. 7

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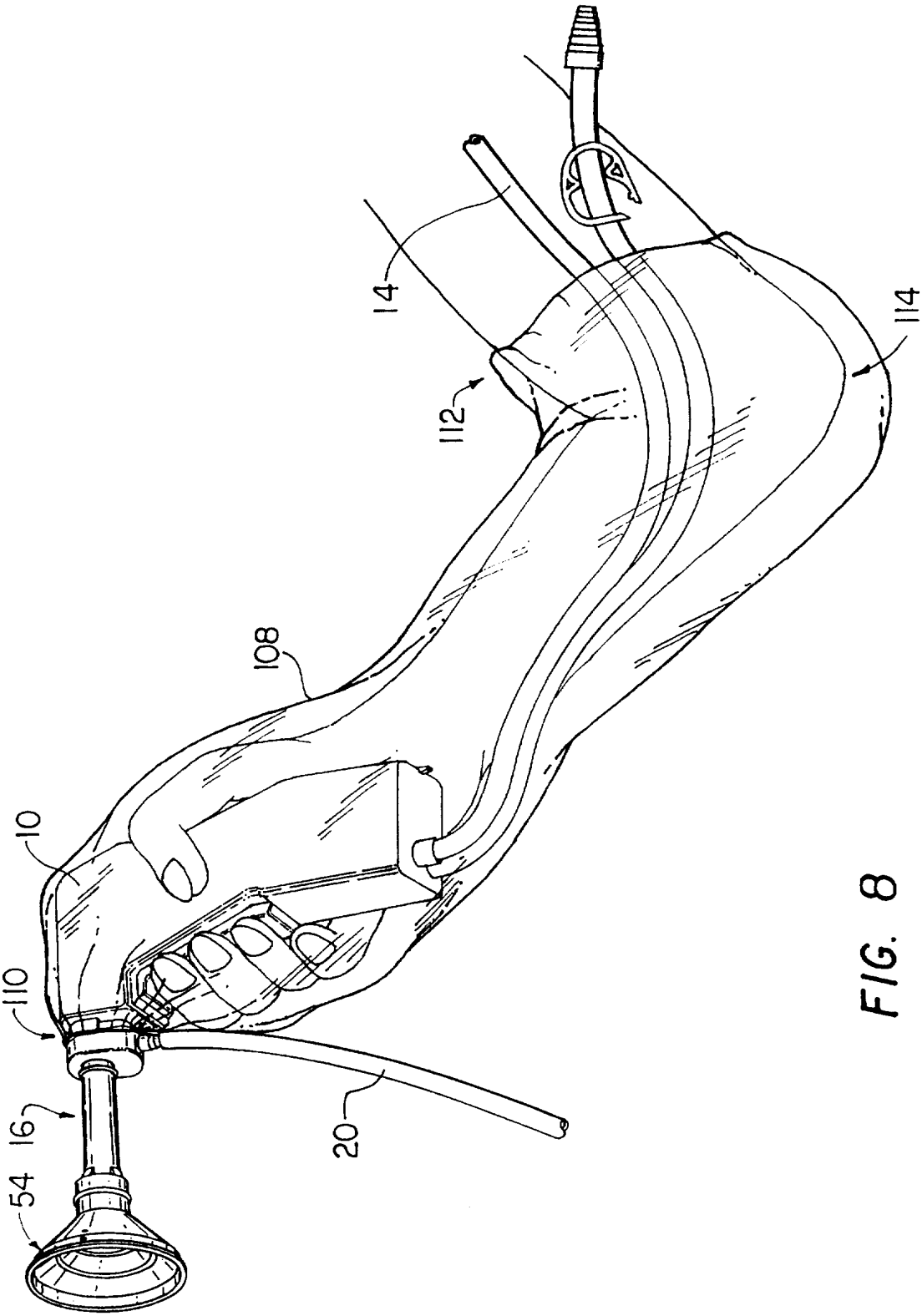


FIG. 8

Solventum-Exhibit 1013-1053

PRELIMINARY REPORT

The Effectiveness of Bacterial Filtration In Vented Wound Drains

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Submitted for publication January 29, 1979

The clinical use of vented wound drains requires documentation of the maintenance of a sterile wound environment in the presence of aspirated air. This study was designed to evaluate the effectiveness of a commercially available bacterial filter under conditions of continuous aspiration of room air into a culture medium incubated for 14 days. The control (no filter) group showed growth in all specimens at 24 hr, and the filter group showed no bacterial growth during the experimental period.

INTRODUCTION

Although wound drainage is at least as old as Hippocrates [1], suction drainage of surgical wounds has been increasing in popularity only in recent years. The purpose of wound drainage is the "prevention of collections of fluid: blood, pus, bile, and intestinal contents" [3] within operative wounds with an expected decrease in infection and reduction in healing time. If a surgical drain fails to perform properly, neither of those benefits will accrue.

Wound drains may be divided by mechanism of action: suction (closed or vented), capillary, or gravitational. The most common of the nonsuction drains (the Penrose), in fact, may not even be considered a proper drain at all, but rather a stent to keep an exit would from closing and, hopefully, a wick to draw exudate to the surface by its capillarity [4]. There is some indication that the use of the Penrose drain can actually increase the likelihood of infection [3].

Active suction drainage is only effective, however, so long as the aspirating lumen of the drain remains clear, and the exudate is free to move up the tube. Should the aspirating tube become clogged, drainage ceases. One way to lessen this likelihood is to provide an air vent to the distal end of the aspirating lumen of the tube. This vent permits air to bubble through the tube, substantially reducing both the total amount of viscous liquid in contact with the tube wall at any given moment, and reducing the wound to aspirator transit time. The latter effect assures that, as the oozing from a wound diminishes, air displaces blood from the lumen of the drain before the blood has time to clot and plug the tube.

Venting wound drains to room air, however, provides an easy conduit for airborne bacteria to enter the wound, possibly increasing the risk of infection. Baker and Borchardt [2] studied the extent to which vented sump wound drains permit such bacterial entry into operative wounds, but their data on postoperative infections were largely anecdotal. These authors immersed the distal portions of vented wound drains (Salem Sump Drains) in nutrient broth, and room air was drawn through the tubes under high and low vacuum suction provided by a Gomco pump. Substantial bacterial growth appeared only under the high vacuum condition. None appeared under the low vacuum condition. The differential bacterial growth under the high vacuum condition was attributed by the authors to the greater volume of air flow through the tubes at higher

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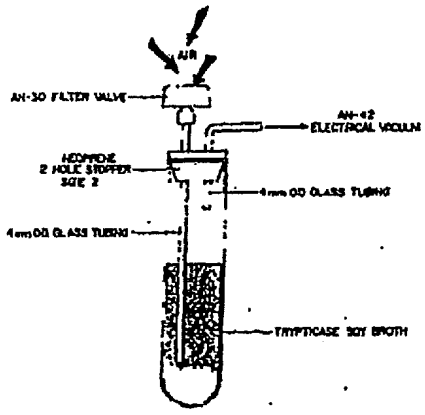


FIG. 1. Diagram of the experimental apparatus with negative suction applied at 24 cm of water.

vacuum, but that remains a parametric issue—at some combination of length of time and vacuum, bacterial contamination seems inevitable.

If the mechanical and physiological advantages of vented suction are to be realized in clinical use, elimination of the risk of bacterial contamination must be accomplished by bacterial filtration. The present study reports the differential effects of the presence or absence of a bacterial filter on an *in vitro* test of a wound drainage system (the Shirley Wound Drain AN-30).[3]

METHOD

Twenty-four filter assemblies of the type attached to the Shirley Wound Drain were used. Each filter assembly consisted of a circular plastic base, 1.5 cm in diameter, a plastic cap perforated to allow the passage of air, and a bacterial filter under the cap and over a port in the base through which the wound drain tube is usually attached. The filter is a 1-μm nonwettable bacterial filter.[3] Six units were assembled without the filter. Each filter assembly (with and without filter) was mounted on a 4.0-mm o.d. glass tube and inserted through a No. 2, two-hole neoprene stopper. Also inserted into the stopper was a shorter 4.0-mm o.d. glass (vacuum) tube (see Fig. 1). All assemblies were then wrapped in cloth, and sterilized in ethylene oxide (Anprolene)[2] and aerated for 24 hr at room temperature. Thirty culture tubes were each filled with 20 ml of trypticase soy broth, capped, and autoclaved for 15 min at 15 lbs. pressure and 250°F. Each sterile filter assembly was then unwrapped using sterile technique. The culture tube cap was removed and the long glass tube of each filter was securely placed in the mouth of each culture tube. Vacuum was provided by AN 42 Sump Pumps[1] connected to the shorter glass tube, regulated to 24 in. of water. The pumps were allowed to operate continuously for 24 hr, drawing room air through the filter caps into the culture medium after which the vacuum tube of each assembly was cut and heat sealed. The culture tubes were then incubated for 14 days at 37°C.

RESULTS

All of the control (no filter) tubes showed growth of bacteria in the culture medium within 24 hr of the start of incubation. None of the 24 culture tubes to which filter assemblies containing filters had been connected showed any growth of microorganisms at any time during the 14-day incubation period.

DISCUSSION

Since hospital room air likely contains pathogens, it is highly likely that drawing unfiltered room air through a postoperative wound may produce infection. The present data partially replicate those of Baker and Borchardt [2] in this respect. The addition of a filter in this study prevented the entrance of bacteria into a culture medium using simulated clinical conditions and apparatus. While *in vitro* probability of infection, t teria in the culture bro experiment is presumptiv efficacy of the filter a se mal experiments are cur to further investigate th filter in preventing infec noted that even though t by the pumps in the prese the low vacuum range o chardt's [2] study, the growth in the culture me unfiltered wound drains relatively low sources of

CONCLUS

(1) Vented, unfiltered very bacterial contaminat levels of suction.

(2) Addition of a comm filter to the air intake re such contamination as d

[1] H. W. Andersen Products, Inc., Oyster Bay, N. Y.
[2] Pall Corporation, Glen Cove, N. Y.

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paratus. While *in vitro* data vis-a-vis the probability of infection, the absence of bacteria in the culture broth in the present experiment is presumptive evidence of the efficacy of the filter assembly. *In vivo* animal experiments are currently in progress to further investigate the efficacy of the filter in preventing infection. It should be noted that even though the vacuum drawn by the pumps in the present study fell within the low vacuum range of Baker and Borchardt's [2] study, there was bacterial growth in the culture media through which unfiltered wound drains connected to even relatively low sources of vacuum.

CONCLUSION

(1) Vented, unfiltered wound drains convey bacterial contamination at physiologic levels of suction.

(2) Addition of a commercially available filter to the air intake reduces the risk of such contamination as demonstrated in 24 experiments with negative cultures at 14 days of incubation.

(3) The authors believe that this study documents the safety of the vented wound drain for clinical use.

ACKNOWLEDGMENT

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UDC 617.089.48

Ye.M. Levite and L.Z. Khazen

POSSIBILITIES FOR DUAL-LUMEN DRAINAGES IN SURGERY

Department of Anesthesiology and Intensive Therapy (Headed by Dr. N.A. Osipova), P.A. Gertsen Moscow Research Oncological Institute

Drain tubes always cease to operate because the drainage channel is plugged or the perforations are sealed by the surrounding tissues [7]. Many attempts have been made to eliminate these drainage defects by changing the material used to make the tubes, their design and operating features [5, 8-10].

A more effective and reliable solution than others is the use of the principle of dual flow with dual-lumen drainage where the channels are connected to a hollow capped end, while a vacuum is created in one of the channels. The second channel connects with the atmosphere at the drainage end outside the cavity (see figure). Atmospheric air thus constantly penetrates inside the drain through the small pipe channel, then through the connection between the channels and the end, and further through the draining channel. This keeps the draining channel free and the contents of wounds and cavities are evacuated with the air coming through the perforations in the draining channel. Seepage of such drainage prevents the development of a suction effect and sealing of the perforation holes. It is also important to use such a design to create a pressure gradient between the collector cup of the suction pump (greater vacuum) and the drained cavity (lesser vacuum). This creates conditions for constant movement of the cavity (wound) contents towards the collector [3, 5, 10].

Clinical practice currently has domestically produced drains which operate on the dual- flow principle (TMMK tube, Kanshin probes), however the draining volume and the selection of developed drains do not meet the needs of surgery. The situation is even more complicated because the clinical situations require a specific design of drain: varying length of the perforated segment, different level of the beginning of perforations, outlet hole for injecting liquids, etc.

There are two possible ways to provide surgical clinical practice with items for draining: 1) produce different types of drains with limited clinical purpose of each of them; 2) produce a drainage tube

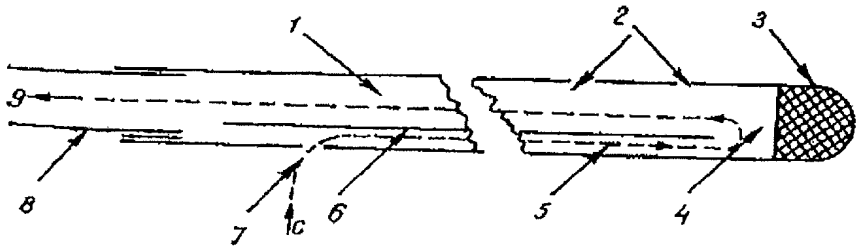


Diagram of Device and Operation of Dual-Lumen Drainage
1. aspiration channel; 2. perforations in aspiration channel; 3. cap on hollow end; 4. connection between channels; 5. air flow through channels; 6. small channel; 7. connection of small channel with the atmosphere; 8. connector to suction pump; 9. air flow to suction pump

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of such design that it can be used as the basis for creating the requisite drains right in the clinic. In the latter case, the drains will be less expensive, and more importantly, more accessible than the mono-functional plant-manufactured items.

We undertook the special creation and testing of a silicon tube of such basic design that would resolve the greatest possible number of clinical tasks. We consider the following to be the minimum list of tasks: 1) draining clean and purulent wounds by the aspiration-flushing method; 2) draining purulent cavities with flushing; 3) draining clean cavities after thoracic and abdominal operations; 4) draining the stomach to evacuate congested fluid; 5) draining the intestine during pareses; 6) draining the stomach and intestine with simultaneous injection of fluid into the small intestine sections located distally to the pathology area. One of the most important requirements for the drain tube was the limitation of its outer diameter so that it could be used as a probe passed through the nasal passage.

A silicon tube was tested with an outer diameter 8 mm, wall thickness of 1 mm and two channels with a cross-section area of approximately 1:3.5 (partition thickness 0.8 mm). We consider the relatively small lumen of the draining (larger) channel to be permissible since the capacity of this channel in this tube design is maintained not by the size of the lumen, but by the constant insufflation or flushing of the drain.

In order to prepare the drain for operation, it is sufficient to cap its hollow end with a plastic or metal cap after removing the partition between the channels to a distance which is 4 – 6 mm greater than the length of the cap. A connection is thus created between the tube channels on the hollow end. The necessary length of the drain is then selected and the requisite number of perforations is cut at the necessary level. The large tube channel is connected by a connector (glass, plastic or metal) to the suction pump main line, while in the small channel (with a 1-2 cm indentation from the end of the connector) a large hole is cut for connection to the atmosphere. When the pleural cavity is drained, the small channel is connected to the atmosphere via a water lock which permits replacement of draining with insufflation while maintaining the necessary vacuum in the pleural cavity equal to the fluid column in the water column. The entire procedure of preparing the drain from the basic tube takes several minutes and requires simple equipment. At the same time, a drainage device may be made.

After surgery on 200 patients on the stomach, esophagus, lungs and mediastinum, the abdominal and/or pleural cavity was drained. The drains in all the patients operated on the dual flow principle and an OP-01 device was used as the suction pump.

The focus when the drains of the described design were used was on lengthening the periods of effective draining from 1-2 days by single-lumen drain to 4 days and more using dual-lumen drainage and insufflation. After thoracic surgery, the quantity of exudates increased from 174 to 263 ml/day. Thus, the total quantity of fluid removed via dual-lumen drains after surgery increases 2-3 times, which, in turn, is better prevention against the formation of residual cavities and empyema.

A lengthier period of effective draining is promoted by periodic flushing of the drain which is done by injecting several milliliters of sterile fluid through the air channel. If this is not done, there is a greater risk for forming crusts in the lumen of the drain channel. The rate of formation of these crusts is linked to the intensity of the air flow through the drain which depends on the magnitude of the established vacuum. Therefore, the vacuum to be created by the suction pump should be checked: in the majority of cases it is within 20-30 cm of water column. Since the suction pump main line includes a

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water lock, during draining of the pleural cavity, the resistance to the air flow rises, which requires an increase in the vacuum to [text cut off]0-50 cm of the water column. A leaking lung after thoracic surgery creates an air flow through the drainage channel and therefore does not require inclusion of an air channel and a water lock, but only until that time when the sealing of the lung is restored.

Draining of the abdominal and pleural cavities after surgery demonstrated the advantages of drains of the described design over the TMMK tube: there were no operating failures in the draining and air channels, there were no difficulties in creating a connection between the channels, the selection of connectors for the drainage channels was simplified was well as the selection of the requisite degree of vacuum: at the same time, it became possible to create a stationary air flow through the draining channels that remained stable over time.

The proposed dual-lumen tube was also used to fabricate pelvic-gastral probes operating on the dual-flow principle (11 patients). The advantages of the dual-lumen probe over the single-lumen are especially obvious here. They are primarily the fact that due to the leaking of the draining channel there is no sealing of the drain holes which occurs practically always during draining by a single-lumen probe due to the elasticity of the gastric walls. The high viscosity of the gastric and intestinal contents [10] is the cause of possible obturation of the relatively small lumen of the draining channel. In order to restore its passability it is necessary to periodically increase the vacuum in the drainage channel by "milking dry". As observations showed, the same goal may be reached by constant or periodic input of a water-air emulsion through the channels which will dilute the gastric contents (already in the probe lumen) and reduce their viscosity. The passability of the draining channel is thus maintained. A water-air emulsion may be easily produced using an unsealed disposable system filled with sterile liquid and connected to the air channel of the probe.

When a dual-lumen probe was used to intubate the intestine (3 patients), good results were obtained as when probes designed by N. N. Kanshin were used: the probes operated for several days and effectively removed the intestinal stasis. The probes were inserted into the intestinal lumen during laparotomy through the nasal passage using a metal conductor with variable rigidity. There were difficulties inserting the probe due to the viscosity of the silicon rubber and the resulting adhesion of the probe wall to the conductor during its removal. The intestinal probe, like the gastric probe, requires periodic flushing of the channels by the described technique. The advantages of the dual-lumen probe are due to the same reasons as during draining of the stomach.

The high effectiveness of draining with a dual-lumen tube of clean and purulent wounds (aspiration and aspiration-flushing method) is presented in the works of N. N. Kanshin et al. [1, 2, 4]. We could only confirm the effectiveness of draining as applied to drains made of the described dual-lumen tube when they were used in 50 patients after mastectomy, pre-sternal esophageal plastic surgery and abdominal-perineal extirpation of the rectum.

Drains made of a silicon dual-lumen tube 8 mm in diameter thus make it possible to drain wounds, the abdominal and pleural cavities, stomach and intestine. In each specific case, a drain may be fabricated easily which operates on the dual-flow principle, of the necessary length, with the necessary number and level of perforations. Series manufacture of the described tube will help to eliminate the shortage of effective drainage devices in surgical clinics until mass production is set up of disposable devices for varying purposes.

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Solventum-Exhibit 1013-1060

PROGNOSIS OF HEMODYNAMIC CHANGES AND ANTI-ARRHYTHMIC EFFICIENCY OF NEO-GILURYTMAL

V. N. Nesvetov, A. V. Shpektor, V. A. Gorshkov

Summary. A reliable prognosis of anti-arrhythmic efficiency of long-term drug treatment can be made on the basis of the acute drug tolerance test with neo-gilurytmal in patients with extrasystoles. In patients with original left-ventricular enlargement, neo-gilurytmal significantly reduced circular myocardial fibre shortening rate which, however, was not accompanied with any decrease in stroke volume or cardiac output.

УДК 617-089.48

Е. М. Левитэ, Л. З. Хазен

ВОЗМОЖНОСТИ ДВУХПРОСВЕТНЫХ ДРЕНАЖЕЙ В ХИРУРГИИ

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Прекращение работы дренажных трубок всегда происходит в связи с закупоркой дренирующего канала или залипанием перфораций окружающими тканями [7]. Предпринято много попыток устранить эти дефекты дренажей за счет материала для изготовления трубок, а также их конструкции и особенностей эксплуатации [5, 8—10].

Эффективнее и надежнее других решений представляется использование принципа двойного потока с помощью двухпросветного дренажа, каналы которого сообщаются у полостного закругленного торца, а разрежение создается в одном из каналов. Второй канал сообщается с атмосферой на внеполостном конце дренажа (см. рисунок). Таким образом, атмосферный воздух по малому каналу трубки, заходя через сообщение между каналами у торца и далее по дренирующему каналу постоянно проникает внутрь дренажа. Благодаря этому поддерживается свободным дренирующий канал, вместе с воздухом эвакуируется содержимое ран и полостей, поступающее по перфорациям дренирующего канала. Негерметичность такого дренажа предотвращает развитие присасывающего эффекта и залипание перфорационных отверстий. Немаловажное значение имеет и создание с помощью такой конструкции градиента давления между банкой — сборником отсасывателя (бо́льшее разрежение) и дренируемой полостью (меньшее разрежение). Благодаря этому создаются условия для постоянного движения содержимого полости (раны) в сторону сборника [3, 5, 10].

В настоящее время клиника располагает отечественными дренажами для проведения дренирования по принципу двойного потока (трубка ТМ-МК, зонды Каншина), однако объем выпуска и ассортимент разработанных дренажей не удовлетворяют потребностям хирургии. Положение осложняется тем, что клинические ситуации требуют конкретной конструкции дренажа: различная протяженность перфорированного отрезка, разный уровень начала перфораций, выходного отверстия для введения жидкостей и т. д.

Возможны два пути обеспечения хирургической клиники изделиями для дренирования: 1) производство различных типов дренажей с ограниченным клиническим назначением каждого из них; 2) производство дренажной

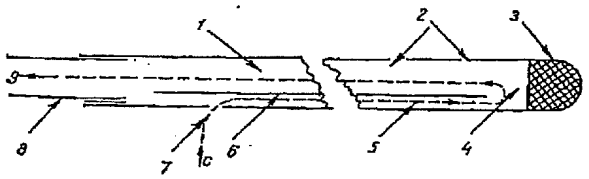


Схема устройства и работы двухпросветного дренажа.
1 — аспирационный канал; *2* — перфорации в канале аспирации; *3* — заглушка полостного торца; *4* — сообщение между каналами; *5* — поток воздуха по каналам; *6* — малый канал; *7* — сообщение малого канала с атмосферой; *8* — коннектор к отсасывателю; *9* — поток воздуха к отсасывателю.

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трубки такой конструкции, на основе которой уже в клинике можно создать нужные дренажи. В последнем случае дренажи будут дешевле, а главное, доступнее монофункциональных фабричных изделий.

Нами проведена специальная работа по созданию и испытанию силиконовой трубки такой базовой конструкции, которая бы позволяла решить возможно большее число клинических задач. Минимальным перечнем задач считаем следующий: 1) дренирование чистых и гнойных ран, ведение их по аспирационно-промывному методу; 2) дренирование гнойных полостей с промыванием; 3) дренирование чистых полостей после торакальных и абдоминальных операций; 4) дренирование желудка для эвакуации застойной жидкости; 5) дренирование кишечника при парезах; 6) дренирование желудка и кишечника с одномоментным введением жидкости в отделы тонкой кишки, расположенные дистальнее зоны патологии. Одним из важных требований к дренажной трубке являлось ограничение ее внешнего диаметра с таким расчетом, чтобы она могла быть использована в качестве зонда, проводимого через носовой ход.

Для испытаний была выбрана силиконовая трубка с наружным диаметром 8 мм, толщиной стенки 1 мм и двумя каналами с их площадью в поперечном сечении примерно 1 : 3,5 (толщина перегородки 0,8 мм). Относительно малый просвет дренирующего (бо́льшего) канала считаем допустимым, поскольку проходимость этого канала в данной конструкции трубки поддерживается не величиной просвета, а постоянным продуванием или промыванием дренажа.

Для подготовки дренажа к работе достаточно заглушить его полостной торец пластмассовой или металлической заглушкой после удаления перегородки между каналами на расстоянии, превышающем длину заглушки на 4—6 мм. Таким образом создается сообщение между каналами трубки на полостном конце. Далее выбирается нужная длина дренажа, вырезаются перфорации в нужном числе и на нужном уровне. Большой канал трубки соединяется коннектором (стеклянным, пластмассовым, металлическим) с магистралью отсасывателя, а в малом канале (с отступом от конца коннектора на 1—2 см) вырезается большое отверстие для соединения с атмосферой. При дренировании плевральной полости малый канал соединяется с атмосферой через водный замок, который дает возможность изменить дренирование с продуванием на в то же время поддерживать необходимое разрежение в плевральной полости, равное столбу жидкости в водном замке. Вся процедура подготовки дренажа из базовой трубки занимает несколько минут и требует несложного оборудования. В то же время может быть изготовлено дренажное устройство.

У 200 больных после операций на желудке, пищеводе, легких, средостении дренировалась брюшная и (или) плевральная полость. У всех больных дренажи работали по принципу двухпросветного потока, в качестве отсасывателя применяли устройство ОП-01.

При использовании дренажей описанной конструкции обращало на себя внимание удлинение сроков эффективного дренирования с 1—2 дней при однопросветном дренаже до 4 дней и более при двухпросветном дренаже с продуванием. После торакальных операций количество экссудата увеличилось со 174 до 263 мл/сут. Таким образом, общее количество жидкости, удаляемое по двухпросветным дренажам после операции, увеличивается в 2—3 раза, что в свою очередь является лучшей профилактикой образования остаточных полостей и эмпиемы плевры.

Удлинению срока эффективного дренирования способствует периодическое промывание дренажа, которое осуществляется введением нескольких миллилитров стерильной жидкости через воздушный канал. Если этого не делать, увеличится риск формирования корок в просвете дренирующего канала. Скорость образования этих корок связана с интенсивностью воздушного потока через дренаж, который зависит от величины установленного разрежения. Поэтому разрежение, создаваемое отсасывателем, должно быть умеренным: в большинстве случаев в пределах 20—30 см вод. ст. В связи с включением в магистраль отсасывателя водяного замка при дренировании плевральной полости сопротивление воздушному потоку возрастает,

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ребует увеличения разрежения до 0—50 см вод. ст. Негерметичное легое после торакальных операций созает воздушный поток по дренирующему каналу, и поэтому не требуется ключения воздушного канала и водяого замка, но лишь до той поры, пока герметичность легкого восстановится.

Дренирование брюшной и плевральой полостей после операции показало преимущества дренажей описанной онструкции перед трубкой ТММК: не было отказов в работе дренирующего воздушного каналов, не возникало рудностей при создании сообщения между каналами, упростились подбор оннекторов для каналов дренажа и ыбор необходимой степени разрежения: в то же время появилась возможность создавать стационарный воздушный поток по каналам дренажа, не меняющийся во времени.

Предлагаемая двухпросветная трубка использовалась и для изготовления азогастральных зондов, работающих по принципу двойного потока (11 больных). Здесь особенно видны преимущества двухпросветного зонда перед однопросветным. Они заключаются прежде всего в том, что в связи с негерметичностью дренирующего канала не происходит залипания дренажных отверстий, что практически всегда имеет место при дренировании однопросветным зондом из-за эластичности стенок желудка. Высокая вязкость желудочного и кишечного содержимого [10] является причиной возможной обтурации относительно небольшого просвета дренирующего канала. Для восстановления его проходимости необходимо периодически увеличивать разрежение в канале дренажа с помощью «сдавливания». Эта же цель, как показали наблюдения, может быть достигнута постоянным или периодическим поступлением по каналам водно-воздушной эмульсии, которая разводит содержимое желудка (уже в просвете зонда) и снижает его вязкость. Таким образом поддерживается проходимость дренирующего канала. Водно-воздушную эмульсию можно легко получить с помощью дегерметизированной одноразовой системы, заполненной стерильной жидкостью и подсоединенной к воздушному каналу зонда.

При использовании двухпросветного зонда для интубации кишечника (3 больных) были получены, как и с помощью зондов конструкции Н. Н. Каншина, хорошие результаты: зонды работали в течение нескольких дней и эффективно разгружали застой в кишечнике. Зонды проводили в просвет кишечника во время лапаротомии через носовой ход с помощью металлического проводника с переменной жесткостью. Проведение зонда сопровождалось трудностями, связанными с вязкостью силиконовой резины и возникающим сцеплением между стенкой зонда и проводником при его удалении. Кишечный зонд, как и желудочный, требует периодического промывания каналов по описанной методике. Преимущества двухпросветного зонда объясняются теми же причинами, что и при дренировании желудка.

Высокая эффективность дренирования двухпросветной трубкой чистых и гнойных ран (аспирационный и аспирационно-промывной метод) представлена в работах Н. Н. Каншина и соавт. [1, 2, 4]. Мы смогли лишь подтвердить эффективность дренирования применительно к дренажам из описанной двухпросветной трубки при использовании их у 50 больных после мастэктомии, предгрудинной пластики пищевода, брюшно-промежностной экстирпации прямой кишки.

Таким образом, дренажи, приготовленные из силиконовой двухпросветной трубки диаметром 8 мм, дают возможность производить дренирование ран, брюшной и плевральной полости, желудка, кишечника. В каждом отдельном случае может быть легко изготовлен дренаж, работающий по принципу двойного потока нужной длины, с нужным числом и уровнем перфораций. Серийное изготовление описанной трубки поможет устранить дефицит эффективных дренирующих средств в хирургических клиниках до тех пор, когда будет налажен массовый выпуск одноразовых устройств для различных назначений.

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Europäisches Patentamt
European Patent Office
Office européen des brevets

Notice of opposition to a European patent

I. Patent opposed

Patent No.	EP2127690
Application No.	EP09165687.6
Date of mention of the grant in the European Patent Bulletin (Art. 97(3), Art. 99(1) EPC)	20 June 2012
Title of the invention	Wound Closure and Drainage System

II. Proprietor of the patent

first named in the patent specification	Adahan, Carmeli
Opponent's or representative's reference	K 81 450/8

III. Opponent

Name	SCHMITT-NILSON Gerhard
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State of residence or of principal place of business	Germany
Country of nationality	Germany
Multiple opponents (see additional sheet)	☒

IV. Authorisation

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Multiple representatives (see additional sheet) ☐

Authorisation(s)

is/are enclosed ☐

has/have been registered under No. ☐

V. Opposition is filed against

the patent as a whole ☒

claim(s) No(s).

VI. Grounds for opposition:

Opposition is based on the following grounds:

(a) the subject-matter of the European patent opposed is not patentable (Art. 100(a) EPC) because:

- it is not new (Art. 52(1); Art. 54 EPC) ☒
- it does not involve an inventive step (Art. 52(1); Art. 56 EPC) ☒
- patentability is excluded on other grounds, namely articles ☐

(b) the patent opposed does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Art. 100(b) EPC; see Art. 83 EPC). ☐

(c) the subject-matter of the patent opposed extends beyond the content of the application/of the earlier application as filed (Art. 100(c) EPC, see Art. 123(2) EPC). ☒

VII. Facts (Rule 76(2)(c) EPC)

presented in support of the opposition are submitted herewith on an attached document ☒

VIII. Other requests:

- Oral proceedings are hereby requested auxiliarily.

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IX. Evidence presented

D1	Patent document	US6 071 267 (A) , 06.06.2000 original file name: D1_US6071267A.pdf attached as: Published-Evidence-1.pdf
D10	Patent document	US3 516 160 (A) , 23.06.1970 original file name: D10_US3516160.PDF attached as: Published-Evidence-9.PDF
D11	Patent document	US6 817 996 (B2) , 16.11.2004 original file name: D11_US6817996B2.pdf attached as: Published-Evidence-10.pdf
D12	Patent document	US5 578 006 (A) , 26.11.1996 original file name: D12_US5578006A.pdf attached as: Published-Evidence-11.pdf
D13	Non-patent literature - article	Edlich, Richard F. et al., "Evaluation of a New, Improved Surgical Drainage System" The American Journal of Surgery, Vol. 149, February 1985 particular relevance: pages 295-298 original file name: D13_Evalutation_of_a_New_Improved_Surgical_Drainage_System.pdf attached as: Published-Evidence-12.pdf
D14	Patent document	WO00/21586 (A1) , 20.04.2000 original file name: D14_WO0021586A1.pdf attached as: Published-Evidence-13.pdf
D15	Patent document	US2005/0148913 (A1) , 07.07.2005 original file name: D15_US20050148913A1.pdf attached as: Published-Evidence-14.pdf
D16	Non-patent literature - article	Y.M., Levite et al., "Possibilities for Dual-Lumen Drainages in Surgery" Monthly Scientific and Practical Journal, November 1987 particular relevance: pages 39-41 original file name: D16_Possibilities_for_Dual-Lumen_Drainages_in_Surgery.pdf attached as: Published-Evidence-16.pdf
D16 a	Other evidence	original file name: D16a_Translation_of_D16.pdf attached as: Evidence-Tran-1.pdf
D2	Patent document	WO03/016719 (A1) , 27.02.2003 original file name: D2_WO03016719A1.pdf attached as: Published-Evidence-2.pdf
D3	Patent document	WO03/057070 (A2) , 17.07.2003 original file name: D3_WO03057070A2.pdf attached as: Published-Evidence-3.pdf
D4	Patent document	US3 026 874 (A) , 27.03.1962 original file name: D4_US3026874A.pdf attached as: Published-Evidence-4.pdf
D5	Patent document	WO01/34223 (A1) , 17.05.2001 original file name: D5_WO0134223A1.pdf attached as: Published-Evidence-5.pdf

D6	Patent document	WO97/48427 (A2) , 24.12.1997 original file name: D6_WO9748427A2.pdf attached as: Published-Evidence-6.pdf
D7	Patent document	WO2005/061025 (A1) , 07.07.2005 original file name: D7_WO2005061025A1.pdf attached as: Published-Evidence-7.pdf
D8	Non-patent literature - article	Worth, M. H. et al., "The Effectiveness of Bacterial Filtration in Vented Wound Drains" Journal of Surgical Research 27, 1979 particular relevance: pages 405-407 original file name: D8_Effectiveness_of_Bacterial_Filtration.pdf attached as: Published-Evidence-8.pdf
D9	Patent document	RU240188 (A) , 21.03.1969 original file name: D9_R240188A.pdf attached as: Published-Evidence-15.pdf
D9a	Other evidence	original file name: D9a_Engl_trl_of_D9.pdf attached as: Evidence-Tran-2.pdf

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X. Payment

Mode of payment	Debit from deposit account

The European Patent Office is hereby authorised, to debit from the deposit account with the EPO any fees and costs indicated in the fees section below.

Currency:	EUR
Deposit account number:	28000439
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Fees

	Factor applied	Fee schedule	Amount to be paid
010 Opposition fee	1	745.00	745.00
Total:		EUR	745.00

A	Forms	Details:	System file name:
A-1	Form for notice of opposition		ep-oppo.pdf

B	Attached document files	Original file name:	System file name:
B-1	1. Facts and arguments	130320_K81450_Facts_and_Submissions.pdf	OPPO.pdf
B-2	1. Any annexes (other than citation) to an opposition letter - KSNH-1 Cover Page of EP 2 127 690 B1	KSNH-1_cover_page_EP2127690B1.pdf	OTHER-1.pdf
B-3	2. Any annexes (other than citation) to an opposition letter - KSNH-2 Feature Analysis of Claim 1	KSNH-2_feature_analysis_claim1.pdf	OTHER-2.pdf
B-4	3. Any annexes (other than citation) to an opposition letter - KSNH-3 Publication EP 2 127 690 A2	KSNH-3_EP2127690A2.pdf	OTHER-3.pdf
B-5	4. Any annexes (other than citation) to an opposition letter - KSNH-4 WO 2007/013049 A1	KSNH-4_WO2007013049A1.pdf	OTHER-4.pdf

Solventum-Exhibit 1013-1068

C	Attached evidence files	Original file name:	System file name:
C-1	1. Patent document	D1_US6071267A.pdf	Published-Evidence-1.pdf
C-2	2. Patent document	D2_WO03016719A1.pdf	Published-Evidence-2.pdf
C-3	3. Patent document	D3_WO03057070A2.pdf	Published-Evidence-3.pdf
C-4	4. Patent document	D4_US3026874A.pdf	Published-Evidence-4.pdf
C-5	5. Patent document	D5_WO0134223A1.pdf	Published-Evidence-5.pdf
C-6	6. Patent document	D6_WO9748427A2.pdf	Published-Evidence-6.pdf
C-7	7. Patent document	D7_WO2005061025A1.pdf	Published-Evidence-7.pdf
C-8	8. Patent document	D10_US3516160.PDF	Published-Evidence-9.PDF
C-9	9. Patent document	D11_US6817996B2.pdf	Published-Evidence-10.pdf
C-10	10. Patent document	D12_US5578006A.pdf	Published-Evidence-11.pdf
C-11	11. Patent document	D14_WO0021586A1.pdf	Published-Evidence-13.pdf
C-12	12. Patent document	D15_US20050148913A1.pdf	Published-Evidence-14.pdf
C-13	13. Patent document	D9_R240188A.pdf	Published-Evidence-15.pdf
C-14	1. Non-patent literature - article	D13_Evalutation_of_a_New_Improved_Surgical_Drainage_System.pdf	Published-Evidence-12.pdf
C-15	2. Non-patent literature - article	D8_Effectiveness_of_Bacterial_Filtration.pdf	Published-Evidence-8.pdf
C-16	3. Non-patent literature - article	D16_Possibilities_for_Dual-Lumen_Drainages_in_Surgery.pdf	Published-Evidence-16.pdf
C-17	1. Translation of a citation	D16a_Translation_of_D16.pdf	Evidence-Tran-1.pdf
C-18	2. Translation of a citation	D9a_Engl_trl_of_D9.pdf	Evidence-Tran-2.pdf

Annotations

Title (Author):

1. Note (for EPO)

(KW-tg)

Signature of opponent or representative

Solventum-Exhibit 1013-1069

Place	**Munich**
Date:	**20 March 2013**
Signed by:	**DE, KSNH Patentanwälte Klunker.Schmitt-Nilson.Hirsch, K.-H. Wohlfrom 18805**
Association:	**KSNH Patentanwälte**
Capacity:	**(Representative)**

Solventum-Exhibit 1013-1070

Additional Sheet(s) to Form EP2300E

Opponent's or representative's reference	K 81 450/8

Additional Opponent(s)

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Solventum-Exhibit 1013-1071

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Ihr Zeichen / Your Ref	Unser Zeichen / Our Ref	Tag / Date
--	K 81 450/8	20/03/13

Opposition against EP 2 127 690
Patent Proprietor: ADAHAN, Carmeli
Opponents: Gerhard Schmitt-Nilson and Stefan Waibel

FACTS AND SUBMISSIONS

I.
Ground for opposition

The opposition is filed on the ground that the subject matter of the European Patent EP 2 127 690 (**in the following, for the sake of brevity, "the contested patent"**), extends beyond the content of the application as filed (Art. 100 (c) EPC in combination with Art. 123(2) EPC) and is not patentable under Arts. 52 to 57 EPC (Art. 100 (a) EPC). The cover page of the contested patent is filed herewith as enclosure **KSNH-1**.

II.
Requests

The opponents request

1. to issue a decision revoking the European Patent 2 127 690

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Solventum-Exhibit 1013-1072

in its entirety;

2. as an auxiliary request, to have oral proceedings take place.

III.
Subject matter of the contested patent

The contested patent comprises product claims 1 to 8. Claims 1 to 3 are drawn to an "enclosure". Claim 4 is drawn to a "disposable assembly" comprising the enclosure of claim 1. Claims 5 to 8 are drawn to a "vacuum system" comprising the enclosure of claim 1.

A structured feature analysis of claim 1 of the contested patent is given below. The syntax is slightly altered as compared to the contested patent for an easier readability.

1. An enclosure (12) for draining an open wound from liquids exuded therefrom,

1.1. the enclosure being attachable to the wound circumference so as to define a confined volume and having an enclosure outlet

1.2. the enclosure outlet being connected to a tube (16) in which there is a negative pressure created by means of a vacuum pump (14) so that negative pressure may be created in said volume,

characterized in that

1.3. one or more bleeding holes (37) are provided

1.3.1. adjacent to said enclosure outlet, on the tube (16) outside the enclosure,

1.3.2. such that ambient air can enter said tube (16) via said one or more bleeding holes and flow together with the exuded liquids under the action of the negative pressure, and the ambient pressure may be restored in said confined volume when said vacuum pump (14) is not operating.

A copy of this feature analysis is enclosed as enclosure **KSNH-2**.

k/s/n/h

Product claims 4 ("disposable assembly") and 5 ("vacuum system") refer back to claim 1 and solely have features readily known from the prior art, as will be shown below. A detailed feature analysis is therefore omitted for brevity.

IV.
Prior art documents, on which the opposition is based

D1: US 6 071 267 A

D2: WO 03/016719 A1

D3: WO 03/057070 A2

D4: US 3 026 874 A

D5: WO 01/34223 A1

D6: WO 97/48427 A2

D7: WO 2005/061025 A1

D8: M.H. Worth et al.: The Effectiveness of Bacterial Filtration in Vented Wound Drains, Journal of Surgical Research 27, 1979, Pages 405-407

D9: RU 240188 A

D9a: English translation of D9

D10: US 3 516 160 A

D11: US 6 817 996 B2

D12: US 5 578 006 A

D13: R.F. Edlich et al.: Evaluation of a New, Improved Surgical Drainage System, The American Journal of Surgery, Volume 149, February 1985, Pages 295-298

D14: WO 00/21586 A1

D15: US 2005/0148913 A1

D16: Y.M. Levite, L.Z. Khazen: Possibilities for Dual-Lumen Drainages in Surgery, Sovetskaya Meditsina, 11/1987 Monthly Scientific and Practical Journal, Pages 39-41

D16a: Translation of D16

Prior art references **D1** to **D4** are known from the European Search Report. Prior art references **D5** to **D16** are newly introduced by the opponents. All documents **D1** to **D16** were published before the date of filing of the contested patent, hence are full prior art.

V.
Lack of original disclosure (Art. 100 (c) EPC)

The application that led to the contested patent was published as EP 2 127 690 A2, a copy of which is filed herewith as enclosure **KSNH-3** (in the following also referred to as "**application as filed**"). Said application was a divisional application from a previous application, which was published as WO 2007/013049 A1, a copy of which is filed herewith as enclosure **KSNH-4** (in the following also referred to as "**parent application as filed**").

V.I. Lack of original disclosure of claim 1

The feature combination of claim 1 of the contested patent was not originally disclosed in the application as filed (violation of Art. 100 (c) in combination with Art. 123 (2) EPC).

Claim 1 seems to be based on claim 6 of the application as filed, which corresponds to claim 11 of the parent application as filed. However, claim 1 of the contested patent differs from claim 6 of the application as filed in several aspects:

(1) The expression "an enclosure outlet connectable by means of a tube to an inlet of a vacuum pump so that negative pressure may be created in said volume" was replaced by the language "an enclosure outlet connected to a tube in which there is negative pressure created by means of a vacuum pump so that negative pressure may be created in said volume" (emphasis

added).

This change leads to undisclosed subject matter for two reasons. First, granted claim 1 is drawn to an "enclosure" that comprises a "tube" ("connected to a tube") and a "vacuum pump" ("negative pressure created by means of a vacuum pump"). The "tube" and the "vacuum pump" are explicitly described as elements of the subject matter of claim 1 ("connected") and are not described as elements that can be connected to the enclosure, as was the case in the application as filed ("connectable"). This can also be seen from other factors. Claim 1 explicitly says that the one or more bleeding holes are "outside the enclosure", although they are part of claim 1 drawn to the enclosure. Claim 3, also drawn to the enclosure, contains further features about the vacuum pump, which again shows that the vacuum pump is an element of the subject matter of claim 1. However, the application as filed does nowhere disclose an enclosure that comprises a "tube" and a "vacuum pump". These three elements are described as three distinct, but connected elements throughout the application documents.

Second, even if claim 1 is interpreted as relating to a system comprising an "enclosure", a "tube" and a "vacuum pump", such subject matter would be an inadmissible intermediate generalisation with respect to the application as filed. Whenever the application as filed talks about the assembly as a whole, other aspects of the assembly are described (e.g. "waste container", "outlet of vacuum pump" in claims 1 and 12 of the application as filed; "vacuum pump unit with means for detachably attaching to a drive unit" in claim 12 of the application as filed; "chamber" in claim 14 of the application as filed).

Section H-V-3.2.1 of the Guidelines for Examination says with respect to intermediate generalizations that "the content of the application as filed must not be considered to be a reservoir", from which arbitrary combinations can be taken. In particular, taking a feature from a particular embodiment, "it has to be established that the feature is not related to the other features of

that embodiment". In contrast, "the overall disclosure [has to] justify the generalizing isolation of the feature and its introduction into the claim". In the present case, however, the combination of "enclosure", "tube" and "vacuum pump" is an inadmissible isolation of these features from other related features.

(2) The expression "on the tube outside the enclosure" was inserted during the examination proceedings. The language "outside the enclosure" is not contained in the application as filed. In particular, the word "outside" does not appear in the application as filed. Consequently, the only potential source of original disclosure for this amendment is Fig. 1. However, it is an inadmissible intermediate generalization to only pick the feature "outside the enclosure" out of the context of Fig. 1.

In particular, Fig. 1 clearly shows with regard to the bleeding hole location that the enclosure 12 has a nipple 38 and that the nipple 38 is inserted into the end of tube 16. The bleeding hole 37 is a little bit farther removed from the end of tube 16 than the length of the nipple 38. Therefore, Fig. 1 teaches a very particular attachment between the tube 16 and the enclosure 12 as well as a very particular bleeding hole location with respect to exactly this attachment. Just isolating the general concept of positioning the bleeding hole "outside the enclosure" is an inadmissible intermediate generalization.

V.II. Lack of original disclosure of claims 3, 4 and 5

No part of the application as filed says in a general statement that the vacuum pump comprises a vacuum pump unit and a drive unit. These two elements are always described in combination with other features and their particular attachment to each other. Consequently, the subject matter of claim 3 is an inadmissible intermediate generalisation and therefore violates Art. 123 (2) EPC.

Claims 4 and 5 are drawn to a "disposable assembly" and a "vacuum system", but refer back to claim 1. Consequently, they suffer from the same original disclosure problems as claim 1, at least with respect to the language "outside the enclosure" (see above).

VI.
Lack of novelty of claim 1 (Arts. 100 (a), 54 EPC)

The subject matter of claim 1 of the contested patent is not new with respect to **D5**. This will be shown by the feature comparison below.

In the wording of claim 1 of the contested patent, recited as feature analysis, **D5** discloses the following feature combination (in the following, all references relate to the corresponding passages/figures of **D5**).

1. *An enclosure for draining an open wound from liquids exuded therefrom*: Apparatus for applying negative pressure to a wound site (Abstract), in particular an open wound (page 1, line 4). Wound exudates are sucked into a "wound exudate container 6" (Fig. 1: page 4, lines 11-13).

1.1. *the enclosure being attachable to the wound circumference so as to define a confined volume and having an enclosure outlet*: The apparatus comprises a "porous pad 1" and an "adapter 3", which are "sealed in airtight manner to the wound site, using a surgical drape" (Fig. 1; page 4, lines 3-6), thereby forming an enclosure with a confined volume. The adapter 3 has an outlet (Fig. 1).

1.2. *the enclosure outlet being connected to a tube in which there is a negative pressure created by means of a vacuum pump so that negative pressure may be created in said volume*: The adapter 3 is connected to "a source of negative pressure such as a pump" via "suction tube 2" (Fig. 1; page 3, line 21 - page 4, line 3), wherein the suction tube 2 has a "first section 11" and a "second section 12" (Fig. 1).

characterized in that

1.3. *one or more bleeding holes are provided*: The second section 12 and - according to some embodiments - the first section 11 of the tube 2 are multi-lumen tubes, with the central lumen applying suction to the wound site (Fig. 1; page 5, lines 5-12). The outer lumen is connected to a "chamber 24", which may be provided with a "valve 102" that "can be opened to atmosphere to release or reduce the negative pressure at the wound site" (Fig. 1; page 5, lines 13-21; emphasis added). Accordingly, the outer lumen, which is in fluid connection with the inner lumen (see e.g. Fig. 1), works as a bleeding hole for the drainage tube (a bleeding hole is defined in the contested patent as a fluid connection to ambient air (paragraph [0033])).

1.3.1. *adjacent to said enclosure outlet, on the tube outside the enclosure*: In Fig. 1, the fluid connection between the outer lumen and the central lumen is adjacent the end of the adapter 3, i.e. adjacent to the enclosure outlet, inside of the adapter end. Page 5, lines 9-13 describes an alternative embodiment, according to which the first section 11 can be a single-lumen tube, only having the suction lumen, and according to which the first section 11 is a "short piece". Accordingly, the fluid connection between the outer lumen and the central lumen, i.e. the bleeding hole in the sense of the contested patent, can be positioned at connector 8 (Fig. 1; page 5, lines 9-13), i.e. on the suction tube outside the enclosure. With the first section 11 being a "short piece", the fluid connection between the outer and central lumen, i.e. the bleeding hole in the sense of the contested patent, is "adjacent to the enclosure outlet".

1.3.2. *such that ambient air can enter said tube via said one or more bleeding holes and flow together with the exuded liquids under the action of the negative pressure, and the ambient pressure may be restored in said confined volume when said vacuum pump is not operating*: It is apparent that air from the outer lumen can enter the central lumen, i.e. the suction tube of the apparatus of **D5** (e.g. Fig. 1). As discussed above, this fluid connection between the outer lumen and the central lumen can be used to "release or reduce the negative pressure" (page 5, lines 13-21). If the fluid connection is used to release the negative pressure, the ambient pressure is restored in the volume of the enclosure. If the fluid connection is used to reduce the negat-

ive pressure, it is apparent that suction and air flow through the bleeding hole are present at the same point in time. In this case, it is apparent from simple thermodynamic considerations that the bleed air flows towards the source of suction, i.e. it "flows together with the exuded liquids under the action of the negative pressure".

Consequently, the subject matter of claim 1 is not new with respect to prior art document **D5**.

VII.
Lack of inventive step of claim 1 (Arts. 100 (a), 56 EPC)

VII.1. Lack of inventive step with respect to the combination of D6 with the skilled person's knowledge

The feature combination of claim 1 of the contested patent lacks inventive step with respect to the combination of **D6** with the skilled person's knowledge.

D6 deals with a "suction and irrigation handpiece and tip" (title) and discloses all features of claim 1 of the contested patent with the exception of feature **1.3.1.**. This will be shown by the feature comparison below.

In the wording of claim 1 of the contested patent, recited as feature analysis, **D6** discloses the following feature combination (in the following, all references relate to the corresponding passages/figures of **D6**).

1. *An enclosure for draining an open wound from liquids exuded therefrom*: **D6** is concerned with devices that "are used to treat bed sores and other injuries that are accessible externally about a patient" (page 1, lines 8-10), i.e. with devices that are used to treat open wounds. In this context, **D6** deals with the problem of such suction devices aspirating "biological debris" from

the wound (page 2, lines 1-4). The device of **D6** has a "shield 54" for enclosing the wound area (cf. Fig. 1). Consequently, the device of **D6** is suitable for draining an open wound from exuded liquids, as is required by claim 1 of the contested patent (cf. statement of purpose: "enclosure for draining an open wound...").

1.1. *the enclosure being attachable to the wound circumference so as to define a confined volume and having an enclosure outlet*: The shield 54 "enables treatment to be confined to a localized treatment site" (page 5, lines 9-10). It may be "shaped during use to conform to the shape and contour of the irrigation site" (page 6, lines 15-17). While the shield 54 is described as a "funnel-shaped splash shield", it is apparent that it serves two purposes. On the one hand, it acts as a splash shield during irrigation. On the other hand, it creates a confined volume for suction to be applied. For this purpose, it is designed to not "collapse under suction" (page 6, lines 13-15). It is apparent that the shield 54 can be attached to the wound circumference, i.e. that it is attachable (cf. Fig. 1). The "proximal collar 78" of the shield 54 is "mounted to the irrigation tube" (page 6, lines 9-11), i.e. it forms an enclosure outlet.

1.2. *the enclosure outlet being connected to a tube in which there is a negative pressure created by means of a vacuum pump so that negative pressure may be created in said volume*: The shield 54 is mounted to an "inner suction tube 46" and an "outer irrigation tube 48" (Fig. 3; page 5, lines 3-11). The suction tube starts at the shield 54 and ends at a lower end 62, "to which the suction tubing 20 from a suction source may be connected" (Fig. 3; page 5, lines 12-19).

characterized in that

1.3. *one or more bleeding holes are provided*: "Vent holes 86" are provided in the shield 54, which connect the volume within the shield 54 with the ambient atmosphere (Fig. 1, 4; page 6, lines 13-15).

1.3.2. *such that ambient air can enter said tube via said one or more bleeding holes and flow together with the exuded liquids under the action of the negative pressure, and the ambient pressure may be restored in said confined volume when said vacuum pump is not operating*: The vent holes 86 "enable air to mix with the debris from the site to avoid stagnation of the debris

within the shield 54" (page 6, lines 13-15). Accordingly, the ambient air flows with the exuded liquids "downstream" from the wound towards the source of suction. It is moreover apparent that the vent holes 86 are air passages through which ambient pressure is restored when the vacuum pump stops working (see Figs.).

Consequently, **D6** teaches all features of claim 1 of the contested patent except for feature **1.3.1.**. In particular, the vent holes of **D6** are provided in the shield 54, i.e. in the enclosure in the sense of the contested patent. In contrast thereto, feature **1.3.1.** requires that the one or more bleeding holes are "adjacent to said enclosure outlet, on the tube outside the enclosure".

It is pointed out that the bleeding holes of the contested patent and of **D6** serve the same purpose, irrespective of their location. **D6** says that the vent holes are provided to "avoid stagnation of the debris" (page 6, lines 13-15). The contested patent says that the bleeding hole "provides for quick movement of exudate [...], before it dries up or coagulates or occludes the tube" (column 6, lines 17-21). Particular emphasis is drawn to the fact that the contested patent mentions this same effect with respect to both locations, i.e. with respect to a bleeding hole "within the enclosure" or "adjacent to it as a tube orifice" (column 6, lines 14-17).

Accordingly, the difference in location of the bleeding hole between the disclosure of **D6** and the subject matter of claim 1 of the contested patent has no technical effect.

Consequently, the objective technical problem underlying the solution of claim 1 of the contested patent was to find an alternative location for the vent hole of **D6** that also prevents clogging of the suction tube towards the source of negative pressure.

It was entirely obvious for a person skilled in the art to place the vent hole outside the shield in the suction tube. The skilled person would have arrived

at this solution by applying solely his general knowledge for the following reasons.

First, it was obvious for a skilled person that the suction tube is the most critical portion of the aspirating system with regard to clogging. As is apparent from Fig. 3 of **D6**, the suction tube 46 has a smaller diameter than the shield 54. Consequently, it was obvious for a skilled person that good care has to be taken to prevent the suction tube from clogging. When faced with the problem of finding an alternative location, it was the most natural choice for the skilled person to place the vent hole(s) in the suction tube and adjacent to the mounting section with the shield, from where the vent hole(s) prevent clogging along the whole length of the suction tube.

Second, **D6** itself contains motivation for the skilled person to move the vent hole(s) from the shield 54 to a different location. The shield is designed in a way to fit to different sizes of wounds. In particular, the shield may be cut along its cone to have a different diameter of the distal opening. For this purpose, a "plurality of circumferential ridges 84 [are] included on the inner surface of the shield 54 to serve as cutting guides for cutting shield 54" (Figs. 1-3; page 6, lines 13-15). As is apparent from Fig. 1, cutting the shield at one of the inner circumferential ridges would result in detaching the portion of the shield with the vent holes 86. In this case, no venting and anti-clogging action would be provided. Accordingly, the skilled person had an incentive inherent in **D6** to move the vent holes from the shield. He obviously would have chosen to move them from the shield, but keep them as close to the fluid entrance as possible. Therefore, on the suction tube adjacent the mounting portion of the shield would have been the obvious choice for placing the vent hole(s).

Consequently, the subject matter of claim 1 of the contested patent is not inventive with respect to the combination of **D6** and the skilled person's knowledge.

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VII.2. Lack of inventive step with respect to the combination of D6 with D7/D8/D9/D10

The feature combination of claim 1 of the contested patent lacks inventive step with respect to the combination of **D6** with any one of **D7**, **D8**, **D9** and **D10**.

In addition to the mere application of the skilled person's knowledge, the claimed solution of the objective technical problem was also made obvious by a number of prior art documents.

D7 shows the placement of a bleeding hole for anti-clogging purposes, which bleed hole is placed at the suction tube right outside the wound volume. As **D7** relates to an apparatus for removing body fluids from wounds (see Abstract), the skilled person would have looked for the solution to the objective technical problem in **D7**.

Particular reference is made to Fig. 2 of **D7**, which shows the overall drainage apparatus and the air flow (indicated by arrows) for removing a clot C. The drainage apparatus has a "drainage lumen 3" and an "auxiliary lumen 5", whose ends are "in fluid communication" (page 3, lines 23-28; page 4, lines 5-6). The clot C can be removed when "fresh air is supplied to the auxiliary lumen 5", from where it enters drainage lumen 3 (page 5, lines 1-4; Fig. 2). Accordingly, the connection with the auxiliary lumen 5 is a bleeding hole in the drainage lumen 3 in the sense of the contested patent.

The drainage apparatus further comprises a "catheter 4", which may as an example be placed "adjacent a wound in a body cavity T" (page 4, lines 3-5). The body cavity is a defined space where the wound treatment takes place. As can be seen from Fig. 2, the bleeding hole, i.e. the fluid connection between the drainage lumen 3 and the auxiliary lumen 5, is right outside this defined space and on the drainage lumen 3. In this way, **D7** teaches to place the bleeding hole right outside the defined space of wound treatment

and at the start of the suction tube. Consequently, when starting from **D6**, prior art document **D7** renders the solution of claim 1 of the contested patent obvious.

Prior art document **D8** also provides the solution to the objective technical problem. **D8** is in the field of "vented wound drains" (title), such that the skilled person would have considered **D8** for finding a solution to the objective technical problem.

D8 explicitly says that the main problem of "active suction drainage" is to keep the aspirating lumen, also referred to as aspirating tube, clear. In particular, **D8** says that "active suction drainage is only effective [...] so long as the aspirating lumen of the drain remains clear, and the exudate is free to move up the tube" (page 405, column 1, last paragraph). In other words, **D8** points out that the small diameter lumen / tube is the most critical part of the system for being clogged. In order to ensure non-clogged operation of the drainage system, **D8** suggests to "provide an air vent to the distal end of the aspirating lumen", which "permits air to bubble through the tube, substantially reducing both the total amount of viscous liquid in contact with the tube wall at any given moment, and reducing the wound to aspirator transit time", which ensures that "air displaces blood from the lumen of the drain before the blood has time to clot and plug the tube" (page 405, column 2, first paragraph).

Applying this teaching to the suction device of **D6**, when faced with the problem of finding an alternative placement for the vent holes, it was obvious for the skilled person to place the vent holes on the aspirating tube as close to the distal end of the aspirating tube as possible, i.e. adjacent to the shield 54. In this way, the skilled person would have reached the subject matter of claim 1 of the contested patent from the combination of **D6** and **D8** without an inventive step.

Prior art document **D9** also provides the solution to the objective technical problem. In the following, all references to text passages are made with respect to document **D9a**, which is the English translation of prior art document **D9**.

D9 concerns a "wound or blister dressing" that is connected to a source of negative pressure ("rarefaction source") for the purpose of "sucking out various liquids" (column 1, first paragraph). **D9** is therefore in the same technological field as the contested patent and would have been considered by the skilled person for solving the objective technical problem.

The wound or blister dressing device of **D9** comprises a "cylindrical aspiration handset 1", which is applied to the wound and is connected to the "vacuum pump 5" via "hose system 2" (Fig. 1; paragraph spanning columns 1 and 2). Outside of the handset 1 and adjacent thereto is an "air suction valve 10" (Fig. 1; paragraph spanning columns 1 and 2). By providing the air suction valve, simultaneous application of negative pressure and efficient transport of drained matter is achieved (column 1, second paragraph: "possible to perform evacuation, the mechanical separation of tissues and the simultaneous removal of failing tissues and traumatic discharge"). In other words, **D9** teaches to provide an air vent outside of and adjacent to the portion of the wound dressing that is applied to the wound.

When faced with the objective technical problem, the skilled person would have applied this teaching to the drainage device of **D6** in such a way that he would have placed the vent holes on the suction tube outside of the shield 54. He would have known from **D6** that this position allows for efficient application of negative pressure, while at the same time ensuring efficient removal of drained matter. Consequently, the skilled person would have arrived at the subject matter of claim 1 of the contested patent by combining **D6** and **D9** without any inventive activity.

The solution to the objective technical problem was also obvious from **D10**. Prior art document **D10** is in the field of "dental aspirating cuspidors" (title), i.e. in the field of liquid drainage from the oral cavity. As **D10** is also in the field of medical drainage equipment and also deals with the problem of ensuring an unimpeded flow of the matter to be drained ("object [...] to provide [...] high volume capacity to eject saliva, water and foreign matter from the patient's mouth" (column 2, lines 37-44)), the skilled person would have considered **D10** for solving the objective technical problem.

D10 teaches to provide the housing of the aspirating device with "venting port means between the ends" (column 1, lines 19-24). The Figs. show a pair of ports 20, 21 that "create an aspirating suction through the second end 14" (Figs.; column 3, lines 26-32). These venting port means are bleeding holes in the sense of the invention, because they allow ambient air to flow into the draining system. In use, the patient puts the "replaceable ejecting portion 22 into his mouth and seals his lips therearound" (column 4, lines 22-32). In this way, the patient's mouth forms an enclosure, from which "saliva, water and foreign matter" are drained. Positioned in this way, the drainage device has the venting ports 20, 21 outside of the sealed mouth, positioned on the suction tube and adjacent to the patient's mouth (which forms the enclosure). This position ensures the mixing of ambient air with the matter to be drained and allows for an effective transport of said matter to the source of suction.

Applying this teaching to the drainage device of **D6**, the skilled person would have placed the vent hole(s) outside the enclosure formed by the shield and adjacent thereto. Accordingly, he would have arrived at the subject matter of claim 1 of the contested patent without an inventive step.

It is pointed out that the mere number of prior art documents that teach feature **1.3.1.** (namely **D7**, **D8**, **D9** and **D10**) already shows that the claimed placement of vent hole(s) was a common measure at the filing date

of the application underlying the contested patent.

Consequently, the subject matter of claim 1 of the contested patent is not inventive with respect to any of the combinations of **D6** with **D7** or **D8** or **D9** or **D10**.

VII.3. Lack of inventive step with respect to the combination of D1 with D7/D8/D9/D10

The feature combination of claim 1 of the contested patent lacks inventive step with respect to the combination of **D1** with any of the prior art documents **D7**, **D8**, **D9**, and **D10**.

D1 deals with a "patient interface system" (title) and discloses all features of claim 1 of the contested patent with the exception of feature **1.3.1.**. This will be shown by the feature comparison below.

In the wording of claim 1 of the contested patent, recited as feature analysis, **D1** discloses the following feature combination (in the following, all references relate to the corresponding passages/figures of **D1**).

1. *An enclosure for draining an open wound from liquids exuded therefrom*: Document **D1** relates to "patient interfaces for fluid management in medical care" (column 1, lines 16-19). In particular, **D1** deals with "wound care [involving] absorbing and/or draining blood, serum and other body fluids" (column 1, lines 21-25). For this purpose, a "patient interface system 2" is provided, whose "drapes 18, 22, 24" form an enclosure over the system (Figs. 1-3; column 3, lines 37-42, column 4, lines 2-13).
1.1. *the enclosure being attachable to the wound circumference so as to define a confined volume and having an enclosure outlet*: The drapes are provided for "covering the fluid transfer subsystem 4 and the areas surrounding the same on a patient 16" (column 4, lines 2-4). The drapes ad-

here to the patient via a "contact adhesive" (column 4, lines 23-27). The drape system has "inlet and outlet openings" (Figs. 1-3; column 4, lines 7-10).

1.2. *the enclosure outlet being connected to a tube in which there is a negative pressure created by means of a vacuum pump so that negative pressure may be created in said volume*: The "suction tube 28" connects the outlet of the enclosure with the "vacuum source 26" (Figs. 1-4; column 4, lines 57-63), such that negative pressure is formed in the interface system 2 through the porous foam materials of the "primary fluid transfer element 12" and the "secondary transfer element 14" (column 3, lines 44-67).

characterized in that

1.3. *one or more bleeding holes are provided*: A "vent 35" is provided for introducing ambient air into the foam material ("primary fluid transfer element 12") under the drapes (Fig. 3; column 6, lines 9-11). It is also generally said that "various other fluid type connections can be utilized for introducing fluid (e.g. air, nitrogen, oxygen, etc.) into the system 2" (column 5, lines 59-61; emphasis added).

1.3.2. *such that ambient air can enter said tube via said one or more bleeding holes and flow together with the exuded liquids under the action of the negative pressure, and the ambient pressure may be restored in said confined volume when said vacuum pump is not operating*: The vacuum source 26 functions "to extract fluids, including the patient's blood, serum, etc., from the interface system 2" (column 4, lines 42-46). It is apparent from simple thermodynamic considerations that bleed air introduced into the interface system 2 through the vent 35 will enter the suction tube 28 and flow towards the vacuum source 26 with the extracted fluids. With the vacuum pump not working, it is apparent that ambient pressure is restored under the drapes through the vent 35. This is especially true, because **D1** explicitly mentions the possibility of "continuous or intermittent suction" and "multiple pressure settings" (column 5, lines 41-45).

Consequently, **D1** teaches all features of claim 1 of the contested patent except for feature **1.3.1.**. In particular, the vent of **D1** is provided with a separ-

ate inlet tube that ends within the enclosure. In contrast thereto, feature **1.3.1.** requires that the one or more bleeding holes are "adjacent to said enclosure outlet, on the tube outside the enclosure".

Introducing ambient air into the wound enclosure has the drawback that this ambient air does not immediately help in the removal of extracted fluids. To the contrary, the bleed air has to pass the flow resistance of the foam materials of the primary and secondary fluid transfer elements 12 and 14, before it flows with the exuded liquids through the suction tube 28.

Accordingly, the technical effect of placing the vent hole in the suction tube and not in a separate tube that ends within the enclosure is to use the bleed air flow more efficiently for the transport of exuded liquids.

Consequently, the objective technical problem is to find a more efficient location for the introduction of the bleed air into the wound drainage system.

The solution of providing the vent hole in the suction tube, outside of and adjacent to the draped enclosure, was made obvious by the teaching of any of the prior art documents **D7**, **D8**, **D9**, and **D10**.

In all of these documents, the vent holes are "downstream" of the wound / cavity in the suction tube. Accordingly, the introduced air immediately helps in transporting the drained matter towards the source of suction (when operating). No air flow to the wound and over the wound is created through the vent holes in these documents.

As these documents were discussed in detail in the previous chapter **VII.2.**, it is only briefly repeated where they disclose that the entering bleed air flows directly towards the source of suction. In **D7**, Fig. 2 nicely illustrates that the bleed air enters through the auxiliary lumen 5 and flows through the drainage lumen 3 without entering the portion of the drainage apparatus in the wound area T. **D8** explicitly says that the vent at the distal end of

the aspirating lumen "permits air to bubble through the tube", which means that it flows towards the source of suction and not towards or over the wound (page 405, column 2, first paragraph). For **D9**, reference is made to Fig. 1. The air suction valve 10 is placed between the wound application portion 1 ("cylindrical aspiration handset") and the vacuum pump 5. With the vacuum pump operating, the air introduced through the suction valve 10 flows towards the source of suction and allows for "removal of failing tissues and traumatic discharge" (column 1, second paragraph). Fig. 1 of **D10** shows the venting port 20 to be between the suction source 13 and the "second end 14", where "saliva, water and foreign matter" enter the aspirating system. Under suction, the introduced air flows with the "saliva, water and foreign matter" towards the suction source.

With all of these documents relating to medical drainage devices and teaching the placement of vent holes in the suction tube outside the area to be drained, the skilled person would have considered these documents for solving the objective technical problem and would have arrived at the subject matter of claim 1 of the contested patent in an obvious manner.

Besides, the mere number of prior art documents that teach feature **1.3.1.** (namely **D7**, **D8**, **D9** and **D10**) already shows that the claimed placement of vent hole(s) was a common measure at the filing date of the application underlying the contested patent.

Consequently, the subject matter of claim 1 of the contested patent is not inventive with respect to any of the combinations of **D1** with **D7** or **D8** or **D9** or **D10**.

VII.4. Lack of inventive step with respect to the combination of D3 with D7/D8/D9/D10

The feature combination of claim 1 of the contested patent lacks inventive

step with respect to the combination of **D3** with any of the prior art documents **D7**, **D8**, **D9**, and **D10**.

D3 is similar to **D1** in that the disclosed "vented vacuum bandage" of **D3** also has a separate vent, i.e. a vent without direct fluid connection to the drainage tube, which vent introduces air into the wound area and creates air flow through the bandage. Therefore, the problem solution approach for the combination of **D3** with **D7/D8/D9/D10** is very similar to the problem solution approach for the combination of **D1** with **D7/D8/D9/D10**. For brevity, the following discussion is therefore limited to pointing out the passages of **D3** disclosing the claimed features and to discussing **D3**.

D3 deals with a "vented vacuum bandage" (title) and discloses all features of claim 1 of the contested patent with the exception of feature **1.3.1.**. This will be shown by the feature comparison below.

In the wording of claim 1 of the contested patent, recited as feature analysis, **D3** discloses the following feature combination (in the following, all references relate to the corresponding passages/figures of **D3**).

1. *An enclosure for draining an open wound from liquids exuded therefrom*: The bandage of **D3** creates a "sealed environment about the wound" (page 2, lines 8-9). The bandage is provided with vacuum suction to "promote blood flow and remove exudate from the wound surface" (page 11, lines 12-14).

1.1. *the enclosure being attachable to the wound circumference so as to define a confined volume and having an enclosure outlet*: The "vacuum bandage 14 [...] is sealed about the wound by a cover or sealing film 13 to create a sealed environment" (Fig. 1; page 11, lines 6-11).

1.2. *the enclosure outlet being connected to a tube in which there is a negative pressure created by means of a vacuum pump so that negative pressure may be created in said volume*: The vacuum bandage 14 is coupled to a "vacuum source 16" via a tube system (Fig. 1; page 10, lines 17-20). The vacu-

um source 16 is connected to the sealed environment of the vacuum bandage 14, such that "a negative pressure can be established" therein (page 11, lines 6-11).

characterized in that

1.3. *one or more bleeding holes are provided*: "Vent 19", which is coupled to the vacuum bandage 14 via a "multi-lumen tube 20" (Fig. 1). In particular, the vent system "ventilates the wound during the application of negative pressure to the wound [...] through use of a vent 19 in communication with the surrounding atmosphere" (page 10, lines 22-24).

1.3.2. *such that ambient air can enter said tube via said one or more bleeding holes and flow together with the exuded liquids under the action of the negative pressure, and the ambient pressure may be restored in said confined volume when said vacuum pump is not operating*: The ventilation "acts to prevent the system 10 from becoming static by drawing air in from the surrounding atmosphere through vent 19, to bandage 14 to create air flow above the wound, and out through a vacuum tube in communication with the vacuum source 14" (page 12, lines 7-12). Hence, the introduced bleed air flows with the "exudate from the wound surface" (see feature **1.** above) towards the source of suction. The vent is a permanent connection to the atmosphere ("the term vent is [...] any passageway to the atmosphere", page 2, lines 6-7), such that it is apparent that the ambient pressure is restored in the bandage 14, when suction is no longer applied.

Consequently, **D3** teaches all features of claim 1 of the contested patent except for feature **1.3.1.**. In particular, the vent of **D3** is not in direct fluid communication with the suction tube. The bleed air flows through the bandage 14, before entering the suction tube. Reference is made to Fig. 3 of **D3** where the air enters the space under the bandage 14 (not shown in Fig. 3) through outer lumens 24, before the air is drawn into the inner lumen 22 via connector 15 (page 12, lines 13-22). In contrast thereto, feature **1.3.1.** requires that the one or more bleeding holes are "adjacent to said enclosure outlet, on the tube outside the enclosure".

D3 explicitly talks about the advantage of preventing clogging in this context. Page 36, line 32 to page 37, line 1 says that the "vent [...] opens the system to aspirate the [...] tube of the system which promotes removal of debris that may be clogging the system". Accordingly, the teaching of **D3** has the same purpose as the provision of the bleeding hole in the contested patent ("quick movement of exudate [...] before it dries up or coagulates and occludes the tube", paragraph [0033]).

As discussed above, introducing ambient air into the wound enclosure has the drawback of not using the bleed air efficiently for draining purposes.

Accordingly, the technical effect of placing the vent hole in the suction tube and not providing a vent with independent fluid flow that ends within the enclosure is to use the bleed air flow more efficiently for the transport of wound exudate.

Consequently, the objective technical problem is to to find a more efficient location for the introduction of the bleed air into the wound drainage system.

The solution of providing the vent hole in the suction tube, outside of and adjacent to the draped enclosure, was made obvious by the teaching of any of the prior art documents **D7**, **D8**, **D9**, and **D10**. All of these references teach solutions where the bleed air is drawn right towards the source of suction without entering the wound area.

This has been discussed extensively in chapters **VII.2.** and **VII.3.** above, such that a repetition thereof is omitted for brevity. Above passages regarding the disclosure of **D7**, **D8**, **D9**, and **D10** and their teaching of the solution to the objective technical problem are explicitly incorporated into this chapter by reference.

Consequently, the subject matter of claim 1 of the contested patent is not

inventive with respect to any of the combinations of **D1** with **D7** or **D8** or **D9** or **D10**.

VII.5. Lack of inventive step on the basis of D5

For the unexpected case that the Opposition Division deems the subject matter of claim 1 of the contested patent to be new with respect to **D5**, it is herewith submitted for purely precautionary reasons that the differing features, resulting from such a view, can only be minimal and cannot be the result of more than the common development by a skilled person. In particular, such features are the result of the skilled person's general knowledge and cannot be the basis for an inventive step.

Besides, as has been shown in detail in chapters **VII.1.** to **VII.4.**, all features of claim 1 of the contested patent are known from a plurality of prior art documents that are all in the same field of technology . Consequently, the subject matter of claim 1 of the contested patent is at the very least not inventive with respect to the combination of **D5** with any of the prior art documents **D1**, **D3**, **D7**, **D8**, **D9**, and **D10**.

VIII.
Lack of patentability of the other claims
(Arts. 100 (a), 54, 56 EPC)

VIII.1. Claim 2

The additional feature of a "nipple for connecting said tube", i.e. said negative pressure tube, is a commonplace measure. It refers to a standard way of attaching a tube to a more extended structure. This feature is for example known from **D5** (adapter 3, Fig. 1), **D6** (collar 78, Fig. 3), and **D3** (connector 15, Fig. 3).

Consequently, the subject matter of claim 2 of the contested patent is not new with respect to **D5** and not inventive with respect to any of the combinations discussed above in chapter **VII**.

VIII.2. Claims 3 to 8

All of claims 3 to 8 do not concern the enclosure or the negative pressure tube of the vacuum system. They only concern the "back-end" of the vacuum system, i.e. the vacuum pump and the waste container. All of these additional features are known from **D2**, which is by the same applicant as the contested patent. In this context, reference is made to Fig. 1 of **D2**, whose pump and waste container portions are very similar to the corresponding portions of Fig. 1 of the contested patent.

D2 deals with a "compact vacuum pump" (title) provided for medical applications (abstract), in particular for suctioning of "body fluids, such as blood or emesis" (page 1, lines 6-11). Accordingly, when faced with the problem of providing a suitable vacuum pump for wound draining devices using vacuum, the skilled person would have considered **D2** for finding the solution.

D2 discloses a drive housing 40 with motor 39, crank 27 and reciprocating receptacle rod 26 (Fig. 1; page 10, lines 5-8), i.e. it discloses a drive unit in the sense of the contested patent (cf. paragraph [0038] of the contested patent). **D2** further discloses a canister 10 with several chambers and a diaphragm 24 for creating the vacuum (Fig. 1; page 8, lines 5-23); i.e. it discloses a pump unit in the sense of the contested patent (cf. paragraph [0035] of the contested patent). The multi-chambered canister is coupled to the suction tube 12. Hence, **D2** discloses all additional features of **claim 3** of the contested patent.

D2 explicitly concerns a "disposable vacuum pump" (page 2, lines 1-4), i.e. it discloses a disposable assembly. In this context, **D2** discloses that all com-

ponents of the pump that come into contact with body matter "can be easily disconnected and removed from the pump's drive means to be sterilized or disposed of" (page 2, lines 15-18). Hence, **D2** discloses a detachable attachment between the vacuum pump unit and the drive unit. **D2** also discloses "waste bag 31" connected to an outlet of the canister 10 (Fig. 1; page 8, line 27 to page 9, line 3), hence a connection between the outlet of the vacuum pump unit and the waste container in the sense of the contested patent. Accordingly, **D2** discloses all additional features of **claims 4 and 5** of the contested patent.

As discussed above, **D2** discloses a detachable attachment between the disposable pump unit and the non-disposable drive unit (page 2, lines 15-21). **D2** also talks about manual (dis-)engagement of the components of the vacuum pump (page 2, lines 30-32). **D2** also says explicitly that the three-chambered canister of the vacuum pump may be replaced with a two-chambered canister for gases and liquids (page 5, lines 19-25). Hence, **D2** discloses all additional features of **claims 6, 7 and 8** of the contested patent.

Consequently, the subject matter of claims 3 to 8 of the contested patent is at least not inventive with respect to the following combinations:

- **D5** and **D2**
- **D6** and the **skilled person's knowledge** and **D2**
- **D6** and one of **D7/D8/D9/D10** and **D2**
- **D1** and one of **D7/D8/D9/D10** and **D2**
- **D3** and one of **D7/D8/D9/D10** and **D2**

In this context it is explicitly pointed out that the problems of providing a suitable location for the bleeding hole(s) and of providing a suitable vacuum pump for the vacuum pump system are entirely uncorrelated. The skilled person would have readily identified these two problems as two independent problems and would therefore have consulted different prior art documents for solving these problems.

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IX.
Additional Prior Art

D11 teaches a liposuction cannula (title) for draining "fatty tissue and other debris" from human body incisions (column 1, lines 5-10). The cannula has a vent hole to reduce the risk of clogging. **D11** says with respect to prior art systems without vent holes that "fatty tissue fragments and other fluids move very slowly through the cannula and suction tubing", i.e. that aspirated matter poses the risk of clogging the suction tubing (column 1, lines 43-60). **D11** explicitly deals with the problem of finding good positions for the vent hole(s) of the drainage device. It says that the vent hole can be "positioned along the length of the hollow tube" (column 4, lines 11-13) and that the most advantageous location can be found by experiments ("the position and diameter of the vent hole for maximizing the mass flow rate is based on extensive experimentations and testings"; column 3, lines 52-55). Accordingly, **D11** makes it clear to the skilled person that many locations for vent holes can be suitable and that testing will lead to a good position. Accordingly, the claimed position of the bleeding hole outside the enclosure and adjacent the enclosure would have been found by standard testing and can therefore not be inventive.

D12 relates to a suction catheter 1 (Fig. 1; column 4, line 33 to column 5, line 52). The catheter has a catheter tube 10 and ends in a thickened end area 10a, also referred to as cylindrical piston 10a. The piston provides for "external guidance", such that the positioning thereof defines the aspirating area at the distal end of the piston 10a. The ventilation openings are positioned "immediately after" the cylindrical piston 10a. Consequently, **D12** teaches to provide vent holes right downstream of that portion of the device that defines the drained area.

D13 relates to a portable suction device (page 295, column 1, first sen-

tence). As can be seen from Fig. 1, the suction drain has a drainage lumen and an air vent lumen, with the air vent lumen being in fluid communication with the drain lumen at its end. The air vent lumen is in fluid connection with the atmosphere (page 296, column 2, first paragraph). Accordingly, the location of fluid communication, i.e. the location of the bleeding hole, is at the beginning of the drainage tube. This design is said to ensure "optimal evacuation of fluid from the wound cavity" (page 296, column 2, first paragraph).

D14 is concerned with a negative pressure therapy system (title) and is very similar to **D5**. Fig. 1 shows a foam pad 1, which is "applied or packed over a wound" and sealed thereto via surgical drape 130 (page 4, lines 6-20). Fig. 1 further shows that the suction tube 2 is in fluid communication with branch tube 9, which in turn is connected to a relief valve 11, which in turn is provided for pressure regulation (see also page 5, lines 13-19). Accordingly, the fluid connection between the suction tube 2 and the branch tube 9 forms a bleeding hole. Accordingly, **D14** discloses a negative pressure system very similar to what is claimed by the contested patent.

D15 is also in the field of wound treatment by applying reduced pressure (paragraph [0002]). As can be seen in Fig. 1A, the wound treatment appliance 10 has a wound treatment device 20 and a vacuum system 50 with a reduced pressure supply source 30 (paragraph [0032]). The application explicitly says that small amounts of leakage in the generally hermetic sealing of the wound treatment device, both at the wound end at the bottom and at the upper end, are possible (paragraphs [0033] and [0034]). The hermetic seal may also be broken to drain out "debris, exudate and other material" (paragraph [0041]). In other words, **D15** teaches to create bleed air action to allow for efficient wound exudate drainage.

D16 is in the field of dual-lumen drainages in surgery. In the following, all references to text passages are made with respect to document **D16a**, which is the English translation of prior art document **D16**. As can be readily

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seen from the Fig. on page 39, the dual lumen tube functions as follows (page 39, columns 1, 2): The drainage channel 1 sucks in the "contents of the wound and cavities" that is to be drained through perforations 2. At the same time, atmospheric air enters into channel 6 through opening 7, mixes with the drained matter, and flows to the source of suction together with the drained matter. This "keeps the draining channel free". Accordingly, **D16** teaches to provide bleed air for the transport of drained matter close to the beginning of the drainage tube.

Above considerations justify revocation of the contested patent in its entirety.

Respectfully submitted,

Dr. Karl-Heinz Wohlfrom

Encl.: see EPO form and accompanying additional sheets

Evaluation of a New, Improved Surgical Drainage System

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The development of portable suction devices has allowed a vacuum to be applied to closed wound suction systems when a patient is ambulatory. These devices provide a convenient alternative to electrically powered suction machines that confine a patient to bed. In these portable suction devices, the drainage tubes are connected to vacuum reservoirs that function after being evacuated of air. The configuration of the reservoir is usually either a bellows or bulb. Once the reservoir expands to resume its original shape, it exerts no residual vacuum to the drainage tube. In this event, the reservoir must be collapsed again to evacuate accumulated air, which in turn reinstitutes the applied vacuum to the drainage system.

Although the portable suction devices permit patient ambulation, this advantage must be weighed against the distinct drawbacks. First, this nonvented suction may create sufficient vacuum to aspirate tissue into the holes of the drainage tube which limits the efficiency of the drainage system [1]. Moreover, encroachment of the tissue into the holes of the tube may result in tissue injury that reduces its resistance to infection.

A new multifunctional drainage system has been developed (Axiom Medical Inc., Paramount, CA) that can be used either as a closed drainage system for the ambulating patient or as a filtered sump drainage system for the patient confined to bed. It is the purpose of this report to describe the system's design, fluid mechanics, operation, and clinical performance.

Design

This drainage system consists of three components: a flat drainage tube, a connecting tube, and a reservoir. The flat drainage portion of the system, which is 11 mm wide and 20.3 cm long, is made of silicone and is radiopaque (Figure 1). Two rows of staggered holes are present on either side of the flat surfaces of the drain that communicate with a separate lumen within the tube and drain the fluid from the wound. Interlocking longitudinal plastic ridges are present on the inner surface of the flat drain which prevent the drainage lumen from collapsing from the vacuum source [2]. A separate lumen has been incorporated within the drain that serves as a potential air vent to atmospheric pressure. The exit of the air vent lumen is recessed 9 mm from the open end of the flat drain so that it is not accessible to tissue that may occlude the lumen.

The double-lumen flat silicone drainage tube connects to the double-lumen silicone connecting tube (length 61 cm) by a smooth V-shaped junction that facilitates removal and insertion of the drainage portion of the tube, while ensuring that the drain is not easily dislodged from the wound during clinical use. The air vent lumen of the connecting tube separates from the drainage lumen 3.8 cm from the end of the tube. A removable filter assembly is inserted into the lumen of the air vent. This filter assembly consists of three parts: a female Luer lock, the filter, and a filter cap. The filter has been attached to the air vent system to remove particulate matter and bacteria from the air that passes through the filter. The inner and outer surfaces of the drain and connecting tube are coated with a hydrogel (Hydromer®, Hydromer, Inc., Whitehouse, NJ) that is formed from the reaction of polyvinylpyrrolidone and isocyanate prepolymer. As a hydrogel, it absorbs water and exhibits a low coefficient of friction. Previous investigations performed in our laboratory demonstrated that this coating has two important functions [3]. It reduces the coefficient of friction of the surface of the drain, thus facilitating removal of the drain from the wound, and it limits the adherence of blood clots to the drain, thus allowing them to be evacuated easily into the reservoir.

The drainage lumen is attached to a collapsible bulb reservoir. The entrance of the reservoir has a one-way check valve to prevent reflux of fluid collected in the reservoir. A drainage port is incorporated into the other end of the reservoir to permit emptying. The reservoir is calibrated so that the drainage fluid can be easily measured without emptying the reservoir.

The drainage system can function as either a closed suction system or a filtered sump system. For the closed system, the bacterial filter is simply capped before applying

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Solventum-Exhibit 1013-1101

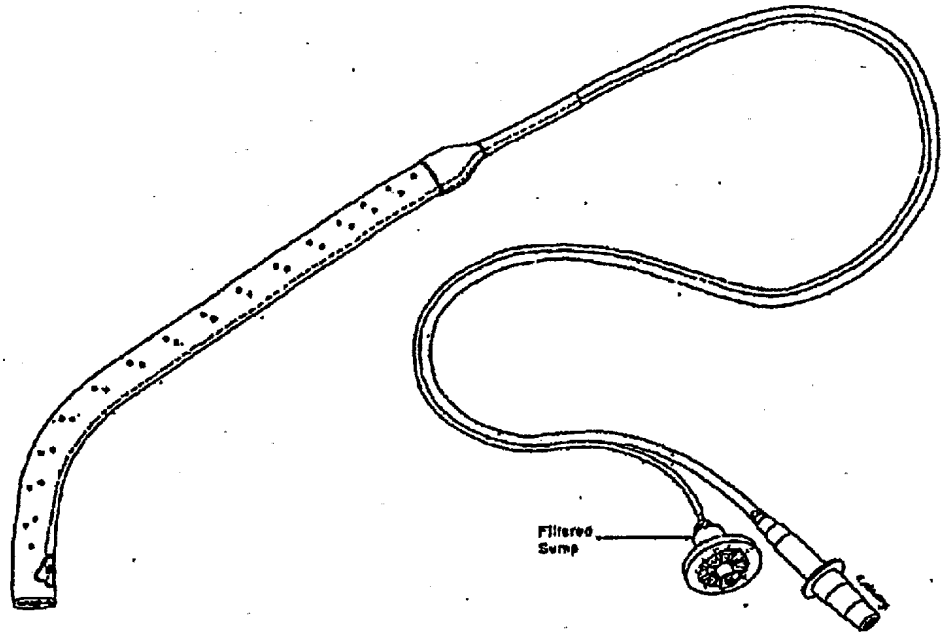


Figure 1. Design of a new surgical suction drain. The exit of the air vent lumen is displayed in the cutaway portion (lower left) of the drainage tube wall.

a vacuum to the system. After removing the cap from the drainage port, air is evacuated from the reservoir by compressing the collapsible reservoir, after which the drainage port is capped. As the reservoir assumes its original shape, a vacuum is applied to the drainage system.

When this system is used as a filtered sump drain, a special plastic adaptor is inserted into the drainage port of the reservoir and then connected with tubing to a calibrated suction outlet or machine. The level of applied vacuum pressure to the drainage lumen is 30 mm Hg. The cap over the filter is removed, providing access for filtered air into the air vent lumen. When converting from sump suction to closed suction, it is important to replace the cap on the filter assembly. If the filter assembly is not capped, the collapsible bulb will become filled with air and no longer serve as a vacuum source. Moreover, fluid will drain by gravity into both the drainage and air vent lumens. When the fluid gains access to the air filter assembly, the wetted filter should be replaced by a new sterile dry filter.

Fluid Mechanics of the Drainage System

A suction drainage system for a wound operates on the principle that a differential pressure exists between the wound and the vacuum source that causes the fluid to move from the wound, a site of high pressure, to the vacuum source, a point of lower pressure. In a closed wound suction system, the wound is sealed so that air is not vented through the skin into the wound. As vacuum is applied to the drain, a pressure differential between the wound and vacuum source is established that evacuates fluid and air from the wound into the drainage tube. After the air and fluid escape from the wound, the applied vacuum causes the edges of the wound to collapse with some invagination of the tissues into the holes of the tube. Eventually, the pressure differential between the wound and vacuum source disappears, eliminating the drain's ability to remove fluid from the wound. By establishing an air vent in the sump drainage tube to atmospheric pressure, it will always maintain a pressure differential between the wound and vacuum source, thus ensuring optimal evacuation of fluid from the wound cavity.

The height of the fluid collection reservoir with respect to the wound has considerable influence on the efficiency of either the closed or vented suction systems. In both systems, a vacuum source of 30 mm Hg is recommended for wound drainage. This pressure is sufficient to lift a column of water 1.34 feet (16.1 inches). When the fluid collection reservoir is 16.1 inches or more above the surface of the wound, the vacuum of 30 mm Hg is not sufficient to evacuate fluid from the wound. Ideally, the fluid collection reservoir should be maintained at or below the level of the wound so that the vacuum of 30 mm Hg is sufficient to evacuate fluids into the collecting reservoir.

Solventum-Exhibit 1013-1102

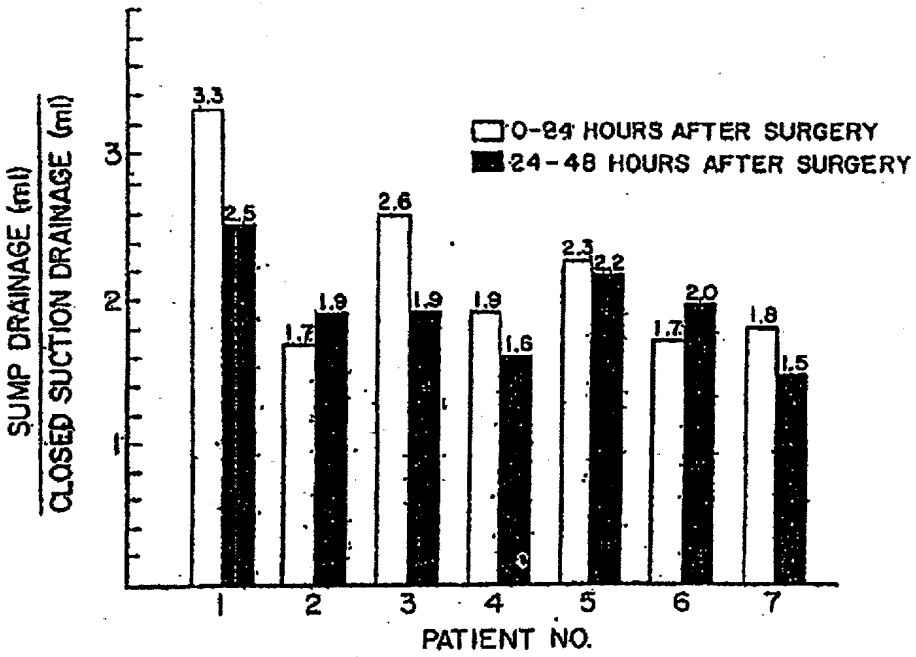


Figure 2. The efficiency of the two drainage techniques was evaluated in each patient by dividing the total volume of fluid collected by air filtered sump drainage by the fluid volume recovered with closed suction drainage.

Operation

At the time of surgery, the drainage system is removed from the sterile package using aseptic technique. The filter assembly is then removed from the drain. The flat drain is placed in the most dependant portion of the wound. Using a no. 11 knife blade, a stab wound measuring 4 mm in length (the external diameter of the silicone connecting portion of the tube) is made through the skin at a site separate from the incision to allow the drain to exit from the wound. A 22.2 cm curved hemostat is then passed through the skin into the wound. The jaws of the hemostat are opened so that one jaw inserts into the air vent lumen and the other into the drainage lumen. The jaws of the hemostat are then closed so that the lumens of the drain are approximated. After grasping the drain, the hemostat and drain are withdrawn through the stab wound, until the smooth V-shaped junction between the flat drain and connecting tube contacts the stab wound. Using a 3-0 braided nylon suture, the connecting tube is secured to the skin.

During the operative procedure and when the patient is confined to bed, the drainage system functions as a filtered sump drainage tube. During either patient transport on a stretcher or when the patient is ambulating, the drainage system operates as a closed suction system using the compressed bulb reservoir as the vacuum source. In either closed suction or sump suction drainage, the reservoir is maintained at or below the level of the patient's wound. When sump drainage is employed, the fluid accumulating in the reservoir must be emptied before its volume becomes so great that the fluid begins to exit into the connecting tube attached to the drainage port. Once fluids enter this tube, the vacuum pressure necessary to evacuate the fluids into the secondary collecting reservoir of the calibrated suction device will be directly related to the location of the collecting reservoir with respect to the patient's wound. As the level of the secondary collecting reservoir increases above that of the wound, the vacuum pressure required to lift a column of fluid into the reservoir becomes greater, subjecting the wound cavity to considerably higher vacuum pressures than 30 mm Hg. These higher vacuum pressures limit the potential benefits of the air vented system and encourage tissue encroachment into the holes of the drainage tubes.

Performance

The effectiveness of the air vent in the drainage system was evaluated in seven patients subjected to reconstruction of large soft tissue defects with large random skin flaps. A constant negative pressure of 30 mm Hg was utilized throughout the study. To compare the efficiency of the vented system to that of the closed suction system, the

Solventum-Exhibit 1013-1103

outlining total denervation of the upper abdomina. We recommend it as the optimum anterior approach to the adrenal glands.

References

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Date
08-04-2013

Reference	Application No./Patent No.
SCB2227EUR	09165687.6 - 1651 / 2127690
Applicant/Proprietor	
Adahan, Carmeli	

Communication of a notice of opposition

You are hereby informed of a notice of opposition to the European patent specified above (see attached copy in the enclosure). The documents specified as patent documents in the notice of opposition are available for inspection via the European Patent Register at **www.epo.org/register**. Should you wish to receive these documents in paper format, they will be supplied to you free of charge if specifically requested on receipt of this communication (see OJ EPO 2009, 434).

If oral proceedings are to take place, parties are advised to check the electronic file via European Patent Register in advance of the hearing to ensure they are in possession of all relevant documents.

An invitation to file observations and to file amendments, where appropriate, to the description, claims and drawings (R. 79(1) EPC) will be issued separately.

The period within which such observations may be filed will not be fixed until the following conditions are met:

(a) the opposition period has expired;

(b) the notice of opposition has been examined for certain formal requirements (R. 77 EPC).

For the Opposition Division

Europäisches Patentamt • European Patent Office • Office européen des brevets

Enclosure: Notice of opposition

01: SCHMITT-NILSON / WAIBEL Stefan / DE
EPA Form : 2300 - Begründung - Dokumenten

Solventum-Exhibit 1013-1105 DS21773

Electronic Patent Application Fee Transmittal

Application Number:	11989297
Filing Date:	24-Jan-2008
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Filer:	Roger Lowen Browdy/Jason Williams
Attorney Docket Number:	ADAHAN16

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

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($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	15648947
Application Number:	11989297
International Application Number:	
Confirmation Number:	4766
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Customer Number:	1444
Filer:	Roger Lowen Browdy/Jason Williams
Filer Authorized By:	Roger Lowen Browdy
Attorney Docket Number:	ADAHAN16
Receipt Date:	30-APR-2013
Filing Date:	24-JAN-2008
Time Stamp:	13:19:12
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	12054
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

Solventum Exhibit 1013-1108

1	Information Disclosure Statement (IDS) Form (SB08)	2013-04-30IDSForm__.pdf	612982 1a89b6423cad0ac1ea5edcde8ac3abac462089c8	no	4
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Warnings:					
Information:					
3	Foreign Reference	WO9748427.pdf	815221 fe3600b0d91e6838bcf4bc8f6cb910110c1fdd9c	no	21
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4	Non Patent Literature	Worth1979.pdf	504375 ac152e2676c77ecac551c42240c928a65e6a2f61	no	3
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5	Non Patent Literature	Levite1987.pdf	1289723 fcfa97c379d6ffa020c98d60e05702ad8f259771	no	7
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6	Non Patent Literature	2013-03-20NoticeofOppositon.pdf	161627 cacb8902e6c461e873128960ae7f8a14038a668c	no	8
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Information:					
7	Non Patent Literature	FactsandSubmissionsOppositionEP2127690.pdf	993788 48cc17f24c1f74252188937e0b0246a8e4227f1c	no	29
Warnings:					
Information:					
8	Non Patent Literature	Edlich1985.pdf	780838 e2e76a00d4f824ae2c5c565f394d05ac31dab189	no	4
Warnings:					
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Solventum-Exhibit 1013-1109

10	Fee Worksheet (SB06)	fee-info.pdf	30477 a8e9ccc0d0aa04e5e1bff96ec360c5874318b55a	no	2

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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.

PRINTER RUSH

(PTO ASSISTANCE)

Application:	11989297	**Examiner:**	Treyger	**GAU:**	3761
From:	Trevon Couch	**Location:**	RTFM	**Creation Date:**	05/01/2013

Tracking #: Week Date:

DOC CODE	DOC DATE	MISCELLANEOUS
[ ] 1449		[ ] Continuing Data
[X] IDS	04/30/2013	[ ] Foreign Priority
[ ] CLM		[ ] Document Legibility
[ ] IIFW/FWCLM		[ ] Fees
[ ] SRFW		[ ] Petition (TC)
[ ] DRW		[ ] Other
[ ] OATH		
[ ] 312		
[ ] SPEC		

[RUSH] Message:

Please respond to the 04/30/13 Ids

Thank you,
Tmc

[XRUSH] Response:

Initials: _____

Examiner: PUBS contacts - for DESIGNS: Don Fairchild, 703-756-1566; for ALL OTHER files: Bernadette Queen, 703-756-1565.
NOTE: This form will be included as part of the official USPTO record with the response document coded as XRUSH.
REV: Oct 11

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

		Atty. Docket: ADAHAN=16
In re Application of:	)	Conf. No.: 4766
Carmeli ADAHAN	)	Art Unit: 3761
Appln. No.: 11/989,297	)	Examiner: Ilya Y. Treyger
Filed: January 24, 2008	)	Washington, D.C.
For: WOUND CLOSURE AND DRAINAGE SYSTEM	)	May 10, 2013

APPLICANT'S INTERVIEW SUMMARY

Honorable Commissioner for Patents
U.S. Patent and Trademark Office
Randolph Building, Mail Stop
401 Dulany Street
Alexandria, VA 22314

Sir:

The interview between Examiner Treyger and the undersigned attorney for applicant on April 3, 2013, is hereby gratefully acknowledged. In this interview the undersigned discussed the claim changes made in the amendment accompanying the RCE filed after receipt of the Notice of Allowance of October 9, 2012. The undersigned explained that the only substantive change was changing "calibrated orifice" to "flow restrictor," which should not change the previously indicated allowability of the claims. The examiner said that he had noticed that and he considered them to be the same except that

"flow restrictor" is a little broader, so he was expanding his search.

The undersigned further advised the examiner that the amendment filed with the RCE inadvertently removed the language "to restrict flow through said venting arrangement" after "flow restrictor." The examiner stated that if the case were found to otherwise be in consideration for allowance, he would add back these words to claims 11 and 42 in an examiner's amendment.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant(s)

By /rlb/
Roger L. Browdy
Registration No. 25,618

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Telephone No.: (202) 628-5197
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G:\BN\C\cohn\Adahan16\Pto\2013-05-10ApplicantsInterviewSummary.doc

Solventum-Exhibit 1013-1113

Electronic Acknowledgement Receipt

EFS ID:	15744055
Application Number:	11989297
International Application Number:	
Confirmation Number:	4766
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Customer Number:	1444
Filer:	Roger Lowen Browdy/Jason Williams
Filer Authorized By:	Roger Lowen Browdy
Attorney Docket Number:	ADAHAN16
Receipt Date:	10-MAY-2013
Filing Date:	24-JAN-2008
Time Stamp:	13:18:08
Application Type:	U.S. National Stage under 35 USC 371

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 summary of interview with examiner	2013-05-10ApplicantsInterviewSummary.pdf	70728 30ed5c6c081aca753111acf737c4ac2076343c97	no	2

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Solventum-Exhibit 1013-1114

Total Files Size (in bytes):	70728

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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.

PRINTER RUSH

(PTO ASSISTANCE)

Application:	11989297	**Examiner:**	Treyger	**GAU:**	3761
From:	Trevon Couch	**Location:**	RTFM	**Creation Date:**	05/01/2013

Tracking #: Week Date:

DOC CODE	DOC DATE	MISCELLANEOUS
[ ] 1449		[ ] Continuing Data
[X] IDS	04/30/2013	[ ] Foreign Priority
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[ ] IIFW/FWCLM		[ ] Fees
[ ] SRFW		[ ] Petition (TC)
[ ] DRW		[ ] Other
[ ] OATH		
[ ] 312		
[ ] SPEC		

[RUSH] Message:

Please respond to the 04/30/13 Ids

Thank you,
Tmc

[XRUSH] Response:

Corrected

Initials: /I.T./

Examiner: PUBS contacts - for DESIGNS: Don Fairchild, 703-756-1566; for ALL OTHER files: Bernadette Queen, 703-756-1565.
NOTE: This form will be included as part of the official USPTO record with the response document coded as XRUSH.
REV: Oct 11

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11989297
Filing Date	2008-01-24
First Named Inventor	Carmeli ADAHAN
Art Unit	3761
Examiner Name	ILYA Y. TREYGER
Attorney Docket Number	ADAHAN=16

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	5578006	A	1996-11-26	STEVENS	
	2	6817996	B2	2004-11-16	FARD et al.	

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	1	20050148913	A1	2005-07-07	WESTON	

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	1	240188	RU		1947-11-03			☒
	2	9748427	WO	A2	1997-12-24	C.R. BARD INC.		☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /I.T./

Receipt date: 04/30/2013	Application Number	11989297	11989297 - GAU: 3761
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2008-01-24	
	First Named Inventor	Carmeli ADAHAN	
	Art Unit	3761	
	Examiner Name	ILYA Y. TREYGER	
	Attorney Docket Number	ADAHAN=16	

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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	Worth et al., "PRELIMINARY REPORT The Effectiveness of Bacterial Filtration In Vented Wound Drains" Journal of Surgical Research 27(6):405-407 (1979)	☐
	2	Levite et al., "POSSIBILITIES FOR DUAL-LUMEN DRAINAGES IN SURGERY" Body of the RSFSR Ministry of Public Health, Monthly Scientific and Practical Journal, pages 39-41. (1987)	☐
	3	Notice of opposition to European patent EP2127690, dated March 20, 2013	☐
	4	Facts and Submissions in Opposition of EP 2127690, dated March 20, 2013	☐
	5	Edlich et al., "Evaluation of a New, Improved Surgical Drainage System" NEW INSTRUMENTS, 149:295-298 (February 1985)	☐
	6	Communication of a notice of opposition of EP 2127690, dated April 8, 2013	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/Ilya Treyger/	Date Considered	05/07/2013

*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. /I.T./

Solventum Exhibit 1013-1118

Receipt date: 04/30/2013

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11989297 11989297 - GAU: 3761
Filing Date	2008-01-24
First Named Inventor	Carmeli ADAHAN
Art Unit	3761
Examiner Name	ILYA Y. TREYGER
Attorney Docket Number	ADAHAN=16

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.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

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	/rlb/	Date (YYYY-MM-DD)	2013-04-30
Name/Print	Roger L. Browdy	Registration Number	25,618

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. /I.T./

Solventum Exhibit 1013-1119

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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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /I.T./

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	4766

1444 7590 05/14/2013

Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

EXAMINER	
TREYGER, ILYA Y	

ART UNIT	PAPER NUMBER
3761	

MAIL DATE	DELIVERY MODE
05/14/2013	PAPER

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.

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Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
11/989,297	24 January, 2008	ADAHAN, CARMELI	ADAHAN16

Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

EXAMINER	
ILYA TREYGER	
ART UNIT	PAPER
3761	20130507

DATE MAILED:

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

Commissioner for Patents

IDS submitted 04/30/2013 has been fully considered and attached. Presented references alone or in combination do not constitute potential 102 or 103 rejections.

/Tatyana Zalukaeva/ Supervisory Patent Examiner, Art Unit 3761	/Ilya Y Treyger/ Examiner, Art Unit 3761

PTO-90C (Rev.04-03)

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)

1444 7590 04/10/2013
Browdy and Neimark, PLLC
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Washington, DC 20006

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.
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	4766

TITLE OF INVENTION: WOUND CLOSURE AND DRAINAGE SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$890	$300	$0	$1190	07/10/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
TREYGER, ILYA Y	3761	604-540000

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 Browdy and Neimark, PLLC
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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Solventum-Exhibit 1013-1123

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 form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

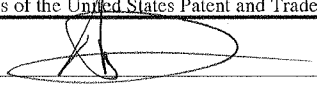
☐ Applicant asserting small entity status. See 37 CFR 1.27

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: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature  Date July 10, 2013

Typed or printed name Allen C. Yun Registration No. 37,971

This collection of information 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.

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Solventum-Exhibit 1013-1124

Electronic Patent Application Fee Transmittal

Application Number:	11989297
Filing Date:	24-Jan-2008
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Filer:	Roger Lowen Browdy/Darryl Whitehurst
Attorney Docket Number:	ADAHAN16

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

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	2501	1	890	890
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Solventum-Exhibit 1013-1125

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1190**

Electronic Acknowledgement Receipt

EFS ID:	16275680
Application Number:	11989297
International Application Number:	
Confirmation Number:	4766
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Customer Number:	1444
Filer:	Roger Lowen Browdy/Darryl Whitehurst
Filer Authorized By:	Roger Lowen Browdy
Attorney Docket Number:	ADAHAN16
Receipt Date:	10-JUL-2013
Filing Date:	24-JAN-2008
Time Stamp:	14:15:35
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1190
RAM confirmation Number	602
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

Solventum Exhibit 1013-1127

1	Issue Fee Payment (PTO-85B)	2013-07-10IFFtransmittal.pdf	150564 08e2bf8c518d7fb219e2041cb0dcc904d110ff8c	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32285 29d42f0cd5228a0c16243f20fe540c5cab911cc5	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	182849	

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
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/989,297	08/13/2013	8506554	ADAHAN16	4766

1444 7590 07/24/2013

Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

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 585 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):

Carmeli Adahan, Jerusalem, ISRAEL;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Solventum-Exhibit 1013-1129

PTO/SB/44 (09-07)
Approved for use through 08/31/2010. OMB 0651-0033
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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : US8506554
APPLICATION NO.: US2009264837
ISSUE DATE : August 13, 2013
INVENTOR(S) : Carmeli Adahan

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Abstract:
A vacuum system for draining an open wound from liquids exuded therefrom, comprising an enclosure sealable to the wound circumference, a vacuum pump including a disposable pump unit detachably attachable to a non-disposable drive unit, and a waste container for collection of drained liquids. The enclosure has an outlet connected by means of a tube to an inlet of the pump unit and the waste container is connected to an outlet of the pump unit, such that when the vacuum pump is operated the drained liquids flow through the vacuum pump. The enclosure has one or more bleeding holes provided therethrough or adjacent to its outlet so that ambient air may enter the tube and flow together with the drained liquids. The enclosure and the waste container are disposable so that the drained liquids contact only disposable elements and may be disposed of together with all disposable elements.

MAILING ADDRESS OF SENDER (Please do not use customer number below):
Carmeli Adahan
11 Netivei Am street
Jerusalem Israel 97552

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 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: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,506,554 B2
APPLICATION NO. : 11/989297
DATED : August 13, 2013
INVENTOR(S) : Carmeli Adahan

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page, Item (57) Abstract should read:

A vacuum system for draining an open wound from liquids exuded therefrom, comprising an enclosure sealable to the wound circumference, a vacuum pump including a disposable pump unit detachably attachable to a non-disposable drive unit, and a waste container for collection of drained liquids. The enclosure has an outlet connected by means of a tube to an inlet of the pump unit and the waste container is connected to an outlet of the pump unit, such that when the vacuum pump is operated the drained liquids flow through the vacuum pump. The enclosure has one or more bleeding holes provided therethrough or adjacent to its outlet so that ambient air may enter the tube and flow together with the drained liquids. The enclosure and the waste container are disposable so that the drained liquids contact only disposable elements and may be disposed of together with all disposable elements.

Signed and Sealed this
Fifteenth Day of April, 2014

Michelle K. Lee

Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : US8506554

APPLICATION NO.: 11/989,297

ISSUE DATE : 8-13-2013

INVENTOR(S) : Carmeli Adahan

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

1. An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement located outside said enclosure and comprising a flow restrictor such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.

It appears that the text " located outside said enclosure and comprising a flow restrictor " is repeated in the claim.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

11 Netivei Am
Jerusalem, Israel 97552

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 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: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,506,554 B2
APPLICATION NO. : 11/989297
DATED : August 13, 2013
INVENTOR(S) : Carmeli Adahan

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 6, lines 17-28, Claim 1 should read

1. An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement located outside said enclosure and comprising a flow restrictor such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.

Signed and Sealed this
Third Day of June, 2014

Michelle K. Lee

Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Atty. Docket: ADAHAN16

In re Patent of:	)	Conf. No.: 4766
Carmeli ADAHAN	)	
U.S. Pat. No. 8,506,554	)	Washington, D.C.
Issued: August 13, 2013	)	June 23, 2014
For: WOUND CLOSURE AND DRAINAGE SYSTEM	)	ATTN: Certificate of Correction Division

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 C.F.R. §1.323

Honorable Commissioner for Patents
U.S. Patent and Trademark Office
Randolph Building, Mail Stop Post Issue
401 Dulany Street
Alexandria, VA 22314

Sir:

In checking over the printed copy of the above-identified patent, we have found the following errors, at least some of which are mistakes on the part of the applicant. It is respectfully requested that these errors be corrected in accordance with 37 C.F.R. §1.323. The errors to be corrected are listed below.

When these changes are considered, it will be clear that all of these errors are of a typographical or clerical error in nature and/or of minor character, which occurred in good faith. Correction thereof does not involve such a change in the patent as would constitute "new matter" or would require further examination.

At claim 1, column 6, lines 25-26, delete “located outside said enclosure and comprising a flow restrictor”.

In the Examiner's Amendment of April 10, 2013, the examiner made a clerical or typographical error by repeating the words "located outside said enclosure and comprising a flow restrictor." That this was an obvious clerical or typographical error made by the examiner in the Examiner's Amendment, is evidenced by the Applicants' Interview Summary, summarizing the telephone interview of April 3, 2013, which was filed on May 10, 2013. This contains the paragraph:

> The undersigned further advised the examiner that the amendment filed with the RCE inadvertently removed the language "to restrict flow through said venting arrangement" after "flow restrictor." The examiner stated that if the case were found to otherwise be in consideration for allowance, he would add back these words to claims 11 and 42 in an examiner's amendment.

In the Applicant-Initiated Interview Summary provided by the examiner for the same telephone interview, the examiner wrote, "Applicant authorized the Examiner to include words 'to restrict flow through said venting arrangement' after words 'flow restrictor' in claims 11 and 42. The examiner correctly added these words in claim 42 (patent claim 12), but inadvertently duplicated the words "located outside said enclosure and comprising a flow restrictor" in the rewritten claim 11 (patent claim 1).

At claim 3, column 6, line 31, delete "of claim". These obviously extraneous words are a typographical error introduced into the claims by applicant in its amendment of application claim 14 (patent claim 3) submitted on February 14, 2011.

At claim 12, column 7, line 11, delete the semicolon (;) and insert a colon (:). Following the colon, start a new paragraph beginning with "an enclosure and a vacuum source..."

Solventum-Exhibit 1013-1135

This is another error introduced by the examiner at the time of the Examiner's Amendment of April 10, 2013. As discussed above, the Applicant's Interview Summary of May 10, 2013, and the Applicant-Initiated Interview Summary issued April 10, 2013, the only changes authorized to application claim 42 (patent claim 12) was the addition of the words "to restrict flow through said venting arrangement" after "flow restrictor." No changes to the preamble were authorized or intended. The previously appearing copy of claim 42, as appearing in the amendment of January 8, 2013, properly showed the preamble ending with a colon and the first paragraph starting with "an enclosure and a vacuum source …" Thus, this was an obvious typographical error on the part of the examiner.

At claim 24, column 8, line 37, delete "vacuum system" and insert "enclosure". Patent claim 24 corresponds to application claim 54, originally introduced by applicant in its amendment of February 13, 2012. However, claim 54 was dependent on claim 11, directed to an enclosure, not a vacuum system (as in independent claim 12, for example). Thus the term "vacuum system" at the beginning of this claim should have read "enclosure," so as to correspond with the wording of the preamble in the claim from which it depends. This is an obvious clerical or typographical error on the part of applicant, the correction of which does not require further examination. The examiner clearly understood claim 54 as having been intended to have been directed to the enclosure of claim 11, rather than the "vacuum system" of claim 11, as claim 11 is not directed to a "vacuum system."

At claim 27, column 8, line 43, delete "enclosure" and substitute "vacuum system". Patent claim 27 corresponds to application claim 57, originally introduced by applicant in its amendment of January 8, 2013. However, claim 57 was dependent on claim 56, directed to a vacuum system, not an enclosure. Thus the term "enclosure" at the

Solventum-Exhibit 1013-1136

beginning of this claim should have read "vacuum system," so as to correspond with the wording of the preamble in the claim from which it depends. This is an obvious clerical or typographical error on the part of applicant, the correction of which does not require further examination. The examiner clearly understood claim 57 as having been intended to have been directed to the vacuum system of claim 56, rather than the "enclosure" of claim 56, as claim 56 is not directed to an "enclosure."

At claim 29, column 8, line 47, delete "enclosure" and insert "vacuum system". Patent claim 29 corresponds to application claim 59, originally introduced by applicant in its amendment of January 8, 2013. However, claim 59 was dependent on claim 58, directed to a vacuum system, not an enclosure. Thus, the term "enclosure" at the beginning of this claim should have read "vacuum system," so as to correspond with the wording of the preamble in the claim from which it depends. This is an obvious clerical or typographical error on the part of applicant, the correction of which does not require further examination. The examiner clearly understood claim 59 as having been intended to have been directed to the vacuum system of claim 58, rather than the "enclosure" of claim 58, as claim 58 is not directed to an "enclosure."

Attached is a Certificate of Correction form showing the above-identified corrections. The present proposed changes will require no additional examination on the part of the examiner as the corrections are merely the correction of typographical errors.

Submitted herewith is a credit card authorization in the amount of $100.00 to cover the appropriate fee for corrections under 37 CFR §1.323. If insufficient fees are specifically authorized, please charge same to Deposit Account No. 02-4035.

Solventum-Exhibit 1013-1137

Granting of this request is earnestly solicited.

Please note that a certificate of correction of claim 1 was issued on June 3, 2014, with respect to patent claim 1. However, this corrected claim 1 was identical to claim 1 of the patent and thus changed nothing. The present certificate of correction as to claim 1 is intended to supersede the certificate issued on June 3, 2014.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant(s)

By _/rlb/_____
Roger L. Browdy
Registration No. 25,618

RLB:jhw
Telephone No.: (202) 628-5197
Facsimile No.: (202) 737-3528
G:\BN\C\cohn\Adahan16\Pto\2014-06-03CertificateofCorrection1323ADAHAN16.doc

Solventum-Exhibit 1013-1138

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8506554

APPLICATION NO.: 11989297

ISSUE DATE : August 13, 2013

INVENTOR(S) : Carmeli ADAHAN

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

At column 6, lines 17-28, Claim 1 should read:

1. An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.

At claim 3, column 6, line 31, delete “of claim”;
At claim 12, column 7, lines 10-13, rewrite these lines to read:

12. A vacuum system for applying negative pressure to a wound, the vacuum system comprising:
an enclosure and a vacuum source, the enclosure being attachable to the wound circumference so as to define a confined volume;

At claim 24, column 8, line 37, delete “vacuum system” and insert --enclosure--;
At claim 27, column 8, line 43, delete “enclosure” and insert --vacuum system--;
At claim 29, column 8, line 47, delete “enclosure” and insert --vacuum system--;

MAILING ADDRESS OF SENDER (Please do not use customer number below):

BROWDY AND NEIMARK, P.L.L.C.
1625 K. Street N.W. Suite 1100
Washington, D.C. 20006

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 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: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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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.

Electronic Patent Application Fee Transmittal

Application Number:	11989297
Filing Date:	24-Jan-2008
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Filer:	Roger Lowen Browdy/Jason Williams
Attorney Docket Number:	ADAHAN16

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

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:				
Certificate of Correction	1811	1	100	100
Extension-of-Time:				

Solventum-Exhibit 1013-1141

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**100**

Electronic Acknowledgement Receipt

EFS ID:	19375836
Application Number:	11989297
International Application Number:	
Confirmation Number:	4766
Title of Invention:	WOUND CLOSURE AND DRAINAGE SYSTEM
First Named Inventor/Applicant Name:	Carmeli Adahan
Customer Number:	1444
Filer:	Roger Lowen Browdy/Jason Williams
Filer Authorized By:	Roger Lowen Browdy
Attorney Docket Number:	ADAHAN16
Receipt Date:	23-JUN-2014
Filing Date:	24-JAN-2008
Time Stamp:	10:58:51
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$100
RAM confirmation Number	8730
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

Solventum Exhibit 1013-1143

1	Request for Certificate of Correction	2014-06-23RequestCertificateofCorrection1323_ADAHAN16.pdf	106364 ba8839fe0d1cee212eed55416772ddd401da137e	no	5
Warnings:					
Information:					
2	Request for Certificate of Correction	2014-06-23CertificateofCorrectionForm-ADAHAN16.pdf	165552 a782d26e4205533333071f0fb4d7083511adb7be	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30158 ae6cb3c817b825c8a306f5e4e70ab23a6f4c40b1	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	302074		

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 DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
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Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
11/989,297	24 January, 2008	ADAHAN, CARMELI	ADAHAN16

Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

EXAMINER	
ILYA TREYGER	
ART UNIT	PAPER
3761	20140812

DATE MAILED:

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

Commissioner for Patents

Certificate of Correction is approved.

/TATYANA ZALUKAEVA/ Supervisory Patent Examiner, Art Unit 3761	/ILYA TREYGER/ Examiner, Art Unit 3761

PTO-90C (Rev.04-03)

SPE RESPONSE FOR CERTIFICATE OF CORRECTION

DATE : 08/12/14

TO SPE OF : ART UNIT: _3761_____ Examiner: __ TREYGER, ILYA
SUBJECT : Request for Certificate of Correction for Appl. No.: 11989297 Patent No.: 8506554

CofC mailroom date: 06/23/14

Please respond to this request for a certificate of correction within 7 days.

FOR IFW FILES:

Please review the requested changes/corrections as shown in the **COCIN** document(s) in the IFW application image. No new matter should be introduced, nor should the scope or meaning of the claims be changed.

Please complete the response (see below) and forward the completed response to scanning using document code **COCX**.

FOR PAPER FILES:

Please review the requested changes/corrections as shown in the attached certificate of correction. Please complete this form (see below) and forward it with the file to:

Certificates of Correction Branch (CofC)
Randolph Square – 9D10-A
Palm Location 7580
You can fax the Directors/SPE response to 571-273-3421

Note: Please check Claims 24, 27and 29
Should the changes to the claims be approved?

Lamonte Newsome

Certificates of Correction Branch

571-272-3421

Thank You For Your Assistance

The request for issuing the above-identified correction(s) is hereby:
Note your decision on the appropriate box.

SPE RESPONSE FOR CERTIFICATE OF CORRECTION

❑ **Approved**	**All** changes apply.
❑ **Approved in Part**	Specify below which changes **do not** apply.
❑ **Denied**	State the reasons for denial below.

Comments: _____

_____

_____

_____

_____

_____ _____

SPE **Art Unit**

Solventum-Exhibit 1013-1147

OK to enter. /I.T./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Atty. Docket: ADAHAN16

In re Patent of:	)	Conf. No.: 4766
Carmeli ADAHAN	)	
U.S. Pat. No. 8,506,554	)	Washington, D.C.
Issued: August 13, 2013	)	June 23, 2014
For: WOUND CLOSURE AND DRAINAGE SYSTEM	)	ATTN: Certificate of Correction Division

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 C.F.R. §1.323

Honorable Commissioner for Patents
U.S. Patent and Trademark Office
Randolph Building, Mail Stop Post Issue
401 Dulany Street
Alexandria, VA 22314

Sir:

In checking over the printed copy of the above-identified patent, we have found the following errors, at least some of which are mistakes on the part of the applicant. It is respectfully requested that these errors be corrected in accordance with 37 C.F.R. §1.323. The errors to be corrected are listed below.

When these changes are considered, it will be clear that all of these errors are of a typographical or clerical error in nature and/or of minor character, which occurred in good faith. Correction thereof does not involve such a change in the patent as would constitute "new matter" or would require further examination.

At claim 1, column 6, lines 25-26, delete "located outside said enclosure and comprising a flow restrictor".

In the Examiner's Amendment of April 10, 2013, the examiner made a clerical or typographical error by repeating the words "located outside said enclosure and comprising a flow restrictor." That this was an obvious clerical or typographical error made by the examiner in the Examiner's Amendment, is evidenced by the Applicants' Interview Summary, summarizing the telephone interview of April 3, 2013, which was filed on May 10, 2013. This contains the paragraph:

> The undersigned further advised the examiner that the amendment filed with the RCE inadvertently removed the language "to restrict flow through said venting arrangement" after "flow restrictor." The examiner stated that if the case were found to otherwise be in consideration for allowance, he would add back these words to claims 11 and 42 in an examiner's amendment.

In the Applicant-Initiated Interview Summary provided by the examiner for the same telephone interview, the examiner wrote, "Applicant authorized the Examiner to include words 'to restrict flow through said venting arrangement' after words 'flow restrictor' in claims 11 and 42. The examiner correctly added these words in claim 42 (patent claim 12), but inadvertently duplicated the words "located outside said enclosure and comprising a flow restrictor" in the rewritten claim 11 (patent claim 1).

At claim 3, column 6, line 31, delete "of claim". These obviously extraneous words are a typographical error introduced into the claims by applicant in its amendment of application claim 14 (patent claim 3) submitted on February 14, 2011.

At claim 12, column 7, line 11, delete the semicolon (;) and insert a colon (:). Following the colon, start a new paragraph beginning with "an enclosure and a vacuum source..."

Solventum-Exhibit 1013-1149

This is another error introduced by the examiner at the time of the Examiner's Amendment of April 10, 2013. As discussed above, the Applicant's Interview Summary of May 10, 2013, and the Applicant-Initiated Interview Summary issued April 10, 2013, the only changes authorized to application claim 42 (patent claim 12) was the addition of the words "to restrict flow through said venting arrangement" after "flow restrictor." No changes to the preamble were authorized or intended. The previously appearing copy of claim 42, as appearing in the amendment of January 8, 2013, properly showed the preamble ending with a colon and the first paragraph starting with "an enclosure and a vacuum source …" Thus, this was an obvious typographical error on the part of the examiner.

At claim 24, column 8, line 37, delete "vacuum system" and insert "enclosure". Patent claim 24 corresponds to application claim 54, originally introduced by applicant in its amendment of February 13, 2012. However, claim 54 was dependent on claim 11, directed to an enclosure, not a vacuum system (as in independent claim 12, for example). Thus the term "vacuum system" at the beginning of this claim should have read "enclosure," so as to correspond with the wording of the preamble in the claim from which it depends. This is an obvious clerical or typographical error on the part of applicant, the correction of which does not require further examination. The examiner clearly understood claim 54 as having been intended to have been directed to the enclosure of claim 11, rather than the "vacuum system" of claim 11, as claim 11 is not directed to a "vacuum system."

At claim 27, column 8, line 43, delete "enclosure" and substitute "vacuum system". Patent claim 27 corresponds to application claim 57, originally introduced by applicant in its amendment of January 8, 2013. However, claim 57 was dependent on claim 56, directed to a vacuum system, not an enclosure. Thus the term "enclosure" at the

Solventum-Exhibit 1013-1150

beginning of this claim should have read "vacuum system," so as to correspond with the wording of the preamble in the claim from which it depends. This is an obvious clerical or typographical error on the part of applicant, the correction of which does not require further examination. The examiner clearly understood claim 57 as having been intended to have been directed to the vacuum system of claim 56, rather than the "enclosure" of claim 56, as claim 56 is not directed to an "enclosure."

At claim 29, column 8, line 47, delete "enclosure" and insert "vacuum system". Patent claim 29 corresponds to application claim 59, originally introduced by applicant in its amendment of January 8, 2013. However, claim 59 was dependent on claim 58, directed to a vacuum system, not an enclosure. Thus, the term "enclosure" at the beginning of this claim should have read "vacuum system," so as to correspond with the wording of the preamble in the claim from which it depends. This is an obvious clerical or typographical error on the part of applicant, the correction of which does not require further examination. The examiner clearly understood claim 59 as having been intended to have been directed to the vacuum system of claim 58, rather than the "enclosure" of claim 58, as claim 58 is not directed to an "enclosure."

Attached is a Certificate of Correction form showing the above-identified corrections. The present proposed changes will require no additional examination on the part of the examiner as the corrections are merely the correction of typographical errors.

Submitted herewith is a credit card authorization in the amount of $100.00 to cover the appropriate fee for corrections under 37 CFR §1.323. If insufficient fees are specifically authorized, please charge same to Deposit Account No. 02-4035.

Solventum-Exhibit 1013-1151

Granting of this request is earnestly solicited.

Please note that a certificate of correction of claim 1 was issued on June 3, 2014, with respect to patent claim 1. However, this corrected claim 1 was identical to claim 1 of the patent and thus changed nothing. The present certificate of correction as to claim 1 is intended to supersede the certificate issued on June 3, 2014.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant(s)

By _/rlb/_____
Roger L. Browdy
Registration No. 25,618

RLB:jhw
Telephone No.: (202) 628-5197
Facsimile No.: (202) 737-3528
G:\BN\C\cohn\Adahan16\Pto\2014-06-03CertificateofCorrection1323ADAHAN16.doc

Solventum-Exhibit 1013-1152

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : US8506554
APPLICATION NO.: US2009264837
ISSUE DATE : August 13, 2013
INVENTOR(S) : Carmeli Adahan

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Abstract:
A vacuum system for draining an open wound from liquids exuded therefrom, comprising an enclosure sealable to the wound circumference, a vacuum pump including a disposable pump unit detachably attachable to a non-disposable drive unit, and a waste container for collection of drained liquids. The enclosure has an outlet connected by means of a tube to an inlet of the pump unit and the waste container is connected to an outlet of the pump unit, such that when the vacuum pump is operated the drained liquids flow through the vacuum pump. The enclosure has one or more bleeding holes provided therethrough or adjacent to its outlet so that ambient air may enter the tube and flow together with the drained liquids. The enclosure and the waste container are disposable so that the drained liquids contact only disposable elements and may be disposed of together with all disposable elements.

MAILING ADDRESS OF SENDER (Please do not use customer number below):
Carmeli Adahan
11 Netivei Am street
Jerusalem Israel 97552

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 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: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : US8506554

APPLICATION NO.: 11/989,297

ISSUE DATE : 8-13-2013

INVENTOR(S) : Carmeli Adahan

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

1. An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement located outside said enclosure and comprising a flow restrictor such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.

It appears that the text " located outside said enclosure and comprising a flow restrictor " is repeated in the claim.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

11 Netivei Am
Jerusalem, Israel 97552

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8506554

APPLICATION NO.: 11989297

ISSUE DATE : August 13, 2013

INVENTOR(S) : Carmeli ADAHAN

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

At column 6, lines 17-28, Claim 1 should read:

1. An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.

At claim 3, column 6, line 31, delete “of claim”;
At claim 12, column 7, lines 10-13, rewrite these lines to read:

12. A vacuum system for applying negative pressure to a wound, the vacuum system comprising:
an enclosure and a vacuum source, the enclosure being attachable to the wound circumference so as to define a confined volume;

At claim 24, column 8, line 37, delete “vacuum system” and insert --enclosure--;
At claim 27, column 8, line 43, delete “enclosure” and insert --vacuum system--;
At claim 29, column 8, line 47, delete “enclosure” and insert --vacuum system--;

MAILING ADDRESS OF SENDER (Please do not use customer number below):

BROWDY AND NEIMARK, P.L.L.C.
1625 K. Street N.W. Suite 1100
Washington, D.C. 20006

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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.

SPE RESPONSE FOR CERTIFICATE OF CORRECTION

DATE : 08/12/14

TO SPE OF : ART UNIT: 3761 Examiner: TREYGER, ILYA
SUBJECT : Request for Certificate of Correction for Appl. No.: 11989297 Patent No.: 8506554

CofC mailroom date: 06/23/14

Please respond to this request for a certificate of correction within 7 days.

FOR IFW FILES:

Please review the requested changes/corrections as shown in the **COCIN** document(s) in the IFW application image. No new matter should be introduced, nor should the scope or meaning of the claims be changed.

Please complete the response (see below) and forward the completed response to scanning using document code **COCX**.

FOR PAPER FILES:

Please review the requested changes/corrections as shown in the attached certificate of correction. Please complete this form (see below) and forward it with the file to:

Certificates of Correction Branch (CofC)
Randolph Square – 9D10-A
Palm Location 7580
You can fax the Directors/SPE response to 571-273-3421

Note: **Please check Claims 24, 27and 29**
Should the changes to the claims be approved?

Lamonte Newsome

Certificates of Correction Branch

571-272-3421

Thank You For Your Assistance

The request for issuing the above-identified correction(s) is hereby:
Note your decision on the appropriate box.

Solventum-Exhibit 1013-1157

SPE RESPONSE FOR CERTIFICATE OF CORRECTION

☐ **Approved** — **All** changes apply.

☐ **Approved in Part** — Specify below which changes **do not** apply.

☐ **Denied** — State the reasons for denial below.

Comments: _____

_____

_____

_____

_____

_____ _____

SPE **Art Unit**

Solventum-Exhibit 1013-1158

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,506,554 B2
APPLICATION NO. : 11/989297
DATED : August 13, 2013
INVENTOR(S) : Carmeli Adahan

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 6, lines 17-28, Claim 1 should read

1. An enclosure for applying negative pressure to a wound, the enclosure being attachable to the wound circumference so as to define a confined volume, and comprising a tube and a venting arrangement, the enclosure having an enclosure outlet connectable to a vacuum source via said tube so that negative pressure can be selectively created in said volume, said venting arrangement located outside said enclosure and comprising a flow restrictor to restrict flow through said venting arrangement such that ambient air can enter said tube via said venting arrangement and flow to said vacuum source without having to enter said enclosure.;

Column 6, line 31, Claim 3, delete "of claim";

Column 7, lines 10-13, Claim 12, rewrite these lines to read:

12. A vacuum system for applying negative pressure to a wound, the vacuum system comprising:

an enclosure and a vacuum source, the enclosure being attachable to the wound circumference so as to define a confined volume;

Column 8, line 37, Claim 24, delete "vacuum system" and insert --enclosure--;

Column 8, line 43, Claim 27, delete "enclosure" and insert --vacuum system--;

Column 8, line 47, Claim 29, delete "enclosure" and insert --vacuum system--.

This certificate supersedes the Certificate of Correction issued June 3, 2014.

Signed and Sealed this
Ninth Day of September, 2014

Michelle K. Lee

Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

POWER OF ATTORNEY BY APPLICANT

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

I hereby appoint:

☒ Practitioners associated with the Customer Number identified in the box at right 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):

191043

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

☒ The address associated with the above-mentioned Customer Number.

I am the:

☐ Applicant.

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign and am authorized to act on behalf of all assignees.

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor.

☐ 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).

SIGNATURE of Applicant for Patent

Signature: _____ Date: _____

Name (printed): Carmeli Adahan

Telephone: 972-50-6406-000

Title and Company: M.E.A.C. ENGINEERING LTD.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. 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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: M.E.A.C. ENGINEERING LTD.

Application No./Patent No.: 11/989,297 - 8,506,554 Filed/Issue Date: 01/24/2008 - 08/13/2013

Titled: WOUND CLOSURE AND DRAINAGE SYSTEM

M.E.A.C. ENGINEERING LTD., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: ADAHAN, CARMEL To: M.E.A.C. ENGINEERING LTD.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 040196, Frame 0564, or for which a copy thereof is attached.

2. From: ADAHAN, CARMELI To: M.E.A.C. ENGINEERING LTD.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 040555, Frame 0928, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). 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 1.11 and 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, 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**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. 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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Erik N. Lund/	06-26-2023
Signature	Date
Erik N. Lund	77,473
Printed or Typed Name	Title or Registration 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.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
11/989,297	**06/26/2023 01:24:49 PM ET**	**ADAHAN16**

Title of Invention

WOUND CLOSURE AND DRAINAGE SYSTEM

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	8506554
CONFIRMATION #	4766	FILED BY	Madeline Nguyen
PATENT CENTER #	62335781	FILING DATE	01/24/2008
CUSTOMER #	1444	FIRST NAMED INVENTOR	Carmeli Adahan
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Erik Lund

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
MEAC_ENGINEERING_LTD_POA.pdf	1	Power of Attorney	179 KB

Warning: The attached file contains comments or annotations. Comments are not recommended and may cause processing problems with the document.

Statement_under_37_CFR_373.pdf	3	Assignee showing of ownership per 37 CFR 3.73	307 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
MEAC_ENGINEERING_LTD_POA.pdf	A64420602ADB9B2ABDD98D7840E5A85CE7B33CDF1DE562D2C4AE2CAFD5EBCE2A9C01873AB255817338BF75E4BD23CFDD04F52AB0580BC05ABA386AB1D5BCDA95
Statement_under_37_CFR_373.pdf	EB259F19576C6077A6A0938D5A414BF4B50D38A19D9413BFF48C9044A5E2E285AD5B6657B3232152A8CB39270141F6B00DCD4A52D850B95BDEDB9DF1CC030E53

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 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
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16

CONFIRMATION NO. 4766

POWER OF ATTORNEY NOTICE

OC000000058740927

1444
Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 550
Washington, DC 20006

Date Mailed: 06/28/2023

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/26/2023.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(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**.

/tawashington/

Solventum-Exhibit 1013-1166

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
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16

CONFIRMATION NO. 4766

191043
Whitestone Law, PLLC
11718 Bowman Green Dr., Suite 200
Reston, VA 20190

POA ACCEPTANCE LETTER

OC000000058740997

Date Mailed: 06/28/2023

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/26/2023.

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**.

/tawashington/

Solventum-Exhibit 1013-1167

TO: elund@whitestone.law,astewart@whitestone.law,info@whitestone.law
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 191043

Wed Jun 28 08:33:16 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

Whitestone Law, PLLC
11718 Bowman Green Dr., Suite 200
Reston,VIRGINIA,20190
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 191043, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:
The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
11989297	N570	06/28/2023	ADAHAN16
11989297	N570	06/28/2023	ADAHAN16

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

ACKNOWLEDGEMENT OF LOSS OF ENTITLEMENT TO ENTITY STATUS DISCOUNT

APPLICATION #	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET #	REQUEST ID
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	91887

The entity status change request below filed through Patent Center on 07/06/2023 has been accepted.

Certifications

APPLICANT CHANGING TO REGULAR UNDISCOUNTED FEE STATUS

Signature

I certify, in accordance with 37 CFR 1.4(d)(4), that I am one of the signatories making the entity status change.

Signature	Name	Registration #
/Erik N . Lund/	Erik Lund	77473

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	
Carmeli ADAHAN	Art Unit: 3761
Application No.: 11/989,297	Examiner: Ilya Y. TREYGER
Filing Date: 01/24/2008	Atty. Ref. No.: ADAHAN16
Title: WOUND CLOSURE AND DRAINAGE	Confirmation No.: 4766

PETITION FOR ACCEPTANCE OF MAINTENANCE FEE BALANCE DUE TO CHANGE IN ENTITY STATUS UNDER 37 C.F.R. § 1.28(c)

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

Dear Sir:

Assignee/Applicant's assertion that Assignee/Applicant is a large entity via the Private PAIR Administration was accepted on July 6, 2023 for the above referenced patent. Assignee/Applicant asserts that small entity status was previously established in good faith, and the Office was not notified of a loss of entitlement to small entity status through error. See 37 CFR 1.28(c).

Assignee/Applicant respectfully requests acceptance of the payment of $3,080 as a deficiency payment as required by 37 CFR 1.28(c)(2). Assignee/Applicant's **Fee Deficiency Payment Itemization** begins at page 2 of this paper.

Respectfully submitted,
WHITESTONE LAW, PLLC

By: /Erik N. Lund/
Erik N. Lund
Registration No. 77,473

U.S.P.T.O. Customer Number 191043
WHITESTONE LAW, PLLC
11718 Bowman Green Dr, STE 200
Reston, VA 20190
703.261.9084 (direct)
703.261.9101 (main)
Deposit Account 60-4958

Date: July 6, 2023

NOTIFICATION OF LOSS OF ENTITY STATUS

Application or Patent No.: 8,506,554	First Named Inventor: Carmeli ADAHAN
Filing Date: 01/24/2008	Title of Invention: WOUND CLOSURE AND DRAINAGE SYSTEM

Applicant or patentee hereby notifies the Office that micro entity status is no longer appropriate in this application or patent. Applicant or patentee asserts that:

☐ Applicant/patentee is entitled to small entity status for this application or patent. See 37 CFR 1.27.

OR

☑ Applicant/patentee will pay undiscounted fees in this application or patent.

FEE DEFICIENCY PAYMENT

(please complete this section if you are correcting prior payments that were erroneously made in the micro entity amount)

☑ Applicant or patentee asserts that micro entity status was previously established in good faith, and that micro entity status either was established in error, or the Office was not notified of a loss of entitlement to micro entity status through error.

Fee Description or Type	Current Fee Amount✧	Amount Previously Paid	Date Previously Paid	Deficiency Owed
3.5 yr Maintenance Fee	$2,000	$800	02/13/2017	$1,200
7.5 yr Maintenance Fee	$3,760	$1880	02/15/2021	$1,880
	Total Deficiency Owed (*sum of all entries in "Deficiency Owed" column*)			$3,080

✧ The "current fee amount" refers to the small entity or undiscounted rate (whichever is applicable) listed on the fee schedule as currently in force at the time this paper is submitted and the deficiency is paid in full. The USPTO fee schedule is available at https://www.uspto.gov/Fees. For more information about submitting fee deficiencies, see MPEP 509.04(f). The MPEP is available at https://www.uspto.gov/MPEP.

NOTIFICATION OF LOSS OF ENTITY STATUS

FEE DEFICIENCY PAYMENT (CONT.)

If you owe a fee deficiency, you must enclose payment for the total fee deficiency amount for prior payments erroneously made in the micro entity amount in this application or patent. Do NOT combine payment for multiple applications or patents. If you owe a fee deficiency in multiple applications or patents, you must submit a separate form and payment for each application or patent.

Please check the applicable box for the form of payment, and follow the corresponding instructions for submitting your form and payment.

☐ A check or U.S. Postal Service money order is enclosed. Please make payable to "Director of the USPTO", and mail this form with the check or money order to:

Mail Stop Petition
Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

☐ Payment by credit card. Do NOT provide credit card information on this form. Instead, enclose a completed Credit Card Payment Form (Form PTO-2038), which is available at https://www.uspto.gov/sites/default/files/documents/PTO-2038.pdf. Submit both forms either by facsimile to (571) 273-8300, or by mail to the address shown above.

☑ The Director is hereby authorized to charge $ 3,080 to USPTO Deposit Account No. 60-4958. If you select this option, this form must be signed by someone who is an authorized user of the deposit account, and who is permitted to sign in accordance with 37 CFR 1.33. If you are paying by deposit account, you may submit this form via the USPTO's patent electronic filing systems (EFS-Web or Patent Center), by facsimile to (571) 273-8300, or by mail to the address shown above.

For more information on accepted payment methods, please see https://www.uspto.gov/learning-and-resources/fees-and-payment/accepted-payment-methods. Payment must be made in U.S. dollars, and if payment is made from a foreign country, the payment must be payable and immediately negotiable in the United States for the full amount of the fee required.

SIGNATURE

This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications.

If applicant or patentee is a juristic entity (e.g., an LLC or corporation), this form must be signed by a registered practitioner. See 37 CFR 1.31.

If applicant or patentee is a person or persons, this form may be signed by either a registered practitioner, or the applicant or patentee. Note that if multiple people together are the applicant or patentee (e.g., there are joint inventors who together are the applicant), then a signature is required from each person who is an applicant or patentee. *Submit multiple forms if more than one signature is required, see below*.*

Signature	Date
/Erik N. Lund/	07-06-23
Name (Print/Typed)	Practitioner Registration Number (if applicable)
Erik N. Lund	77,473

☐ * Total of _____ forms are submitted.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
11/989,297	**07/25/2023 11:26:28 PM ET**	**ADAHAN16**

Title of Invention

WOUND CLOSURE AND DRAINAGE SYSTEM

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	8506554
CONFIRMATION #	4766	FILED BY	Erik Lund
PATENT CENTER #	62504470	FILING DATE	01/24/2008
CUSTOMER #	191043	FIRST NAMED INVENTOR	Carmeli Adahan
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Petition_deficency_payment.pdf	3	Petition for review by the Office of Petitions	257 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Petition_deficency_payment.pdf	8BEB1438234EC997B024C283E34BE552C6CA7872A54914FEBC0CBE978610BE65112D16FB322A826440B755ACFE58FA929B1DCF1CD7E557C3AFBC37266E765312

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 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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/989,297	01/24/2008	Carmeli Adahan	ADAHAN16	4766

191043 7590 10/04/2023

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EXAMINER
TREYGER, ILYA Y

ART UNIT	PAPER NUMBER
3761	

NOTIFICATION DATE	DELIVERY MODE
10/04/2023	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):

astewart@whitestone.law
elund@whitestone.law
info@whitestone.law

Solventum-Exhibit 1013-1175

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In re Patent No. 8,506,554	:	
Issue Date: August 13, 2013	:	NOTICE
Application No. 11/989,297	:	
Filed: January 24, 2008	:	
Attorney Docket No. ADAHAN16		

This is a Notice regarding the request for acceptance of a fee deficiency submission under 37 CFR 1.28(c) filed July 25, 2023.

The Office no longer investigates or rejects original or reissue applications under 37 CFR 1.56. 1098 Off. Gaz. Pat. Office 502 (January 3, 1989). Therefore, nothing in this Notice is intended to imply that an investigation was done.

The fee deficiency submission under 37 CFR 1.28(c) is **ACCEPTED**. Accordingly, status as a small entity has been removed and any future fee(s) submitted must be paid at the undiscounted rate.

Since the address in the present request differs from the correspondence address of record, a courtesy copy of this Notice is being mailed to the address given in the request. However, applicant should note that a change in the correspondence address will not affect the fee address. Therefore, if applicant desires to receive future correspondence which **may** be mailed, regarding maintenance fees, for the above-identified patent, a "Fee Address Indication" form and/or a "Request for Customer Number" form(s) should be submitted (See USPTO form numbers PTO/SB/47 and/or PTO/SB/125).

Inquiries related to this communication should be directed to Jamice Brantley at (571) 272-3814.

/JAMICE T BRANTLEY/
Jamice T Brantley
Paralegal Specialist, Office of Petitions

Cc :Erik N. Lund
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Transmittal Communication on Petition	Application/Control No. 11/989,297	Applicant(s)/Patent Under Reexamination Adahan, Carmeli	
	Deciding Official TREYGER, ILYA Y	Office of Petitions OPET	

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

(ADDITIONAL PARTY'S CORRESPONDENCE ADDRESS)

Erik N. Lund
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Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above-identified Application/Patent.

TO: astewart@whitestone.law,info@whitestone.law,elund@whitestone.law
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 191043

Wed Oct 04 05:02:18 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

Whitestone Law, PLLC
1850 Towers Crescent Plaza, Suite 550
Tysons,VIRGINIA,22182
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 191043, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:
The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
11989297	PETDEC	10/04/2023	ADAHAN16

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

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Sincerely,

The Patent Center Team