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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/730,828	05/12/2020	10646313	SMTX-001-US	9884

80709 7590 04/22/2020

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

Nicholas Mozzicato, Acton, MA;
Solmetex LLC, Northbridge, MA
Richard Goulston, Stuart, MA;
Robin Schofield, Lancaster, MA;
Michael Toole, Norton, MA;

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Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

/N.D.L/	9	6946069		2005-09-20	Chilibeck	
/N.D.L/	10	5613851		1997-03-25	Trawoeger	
/N.D.L/	11	5795159		1998-08-18	Ralls	
/N.D.L/ Change(s) applied to document, /J.M./ 3/9/2020	12	8636837		2014-01-28	~~Duen Dental~~ Nonnenmacher	
/N.D.L/	13	5018971		1991-05-28	Trawoeger	
/N.D.L/	14	4097381		1978-06-27	Ritzler	
/N.D.L/	15	5421996		1995-06-06	Trawoeger	
/N.D.L/	16	7767079		2010-08-03	Darcy	
/N.D.L/	17	6790038		2004-09-14	Hubner	
/N.D.L/	18	7166214		2007-01-23	Armstrong	

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

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	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

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
/N.D.L/	1	6592769		2003-07-15	Erickson	
/N.D.L/	2	6409803		2002-06-25	Tremel	
/N.D.L/	3	6592754		2003-07-15	Chilibeck	
/N.D.L/	4	6692636		2004-02-17	Chilibeck	
/N.D.L/	5	7306460		2007-12-11	Hubner	
/N.D.L/ Change(s) applied to document, /J.M./ 3/19/2020	6	4753632		1988-06-28	~~Duerr Dental~~ Hofmann et al.	
/N.D.L/	7	5330641		1994-07-19	Cattani	
/N.D.L/	8	5797742		1998-08-25	Fraker	

Notice of References Cited	Application/Control No. 15/730,828	Applicant(s)/Patent Under Reexamination MOZZICATO ET AL.	
	Examiner NICHOLAS LUCCHESI	Art Unit 3732	Page 1 of 2

Change(s) applied to document, /J.M./ 3/9/2020

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-54,414 A	05-1866	~~Name not available~~ Sangster	B01D11/043	210/511
*	B	US-1,032,879 A	07-1912	~~Name not available~~ Carlton et al.	B60H1/00485	137/559
*	C	US-2,467,547 A	04-1949	BIRNBAUM SAMUEL L	E03C1/284	210/532.1
*	D	US-4,326,952 A	04-1982	Blake; Gene J.	A61C17/046	210/243
*	E	US-4,385,891 A	05-1983	Ligotti; Eugene F.	A61C17/046	210/249
*	F	US-4,599,170 A	07-1986	Friedman; Denis R.	B01D29/05	210/223
*	G	US-4,761,235 A	08-1988	Haentjens; Kathleen S.	E03C1/266	210/532.1
*	H	US-4,957,621 A	09-1990	Rohloff; Pete	B01D21/0003	210/171
*	I	US-5,114,578 A	05-1992	Sundstrom; Gustaf F.	A61C17/046	210/256
*	J	US-5,421,996 A	06-1995	Trawoger; Werner	A61C17/046	210/232
*	K	US-5,484,282 A	01-1996	Trawoger; Werner	A61C17/046	433/92
*	L	US-6,149,812 A	11-2000	Erickson; Roger T.	A61C17/046	210/521
*	M	US-6,409,803 B1	06-2002	Tremel; James D.	B01D45/12	433/92

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

PART B – FEE(S) TRANSMITTAL

Complete and send this form, together with the applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22314-1450
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)

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

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, EFS-Web transmitted, or facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Steven R Lazar	(Depositor's Name)
/Steven R. Lazar/	(S-signature)
3/30/2020	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
15/730,828	10/12/2017	Mozzicato	SMTX-001-US	9884

TITLE OF INVENTION:

APPLN: TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
Nonprov	Small	$500	0	0	$500	4/23/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS

1. Change of correspondence address or indication of "Fee Address" (37CFR 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 attorney or agent. 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.

1a. NAME OF ASSIGNEE: Solmetex, L.L.C.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Northborough, MA

Please check the appropriate assignee 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 Fees(s): **(Please first reapply and previously paid fee shown above)**
☐ A check is enclosed
☐ Payment be credit card. Form PTO-2038 is attached
☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number (enclose an extra copy of this form)

5. Change of Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature /Steven R. Lazar/ Date 3/30/2020

Typed or printed name Steven R. Lazar Registration No. 32,618

PTOL-85 Part B (06-17) Approved for use through 1/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 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.

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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.

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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 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.

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Electronic Patent Application Fee Transmittal

Application Number:	15730828
Filing Date:	12-Oct-2017
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**500**

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Electronic Acknowledgement Receipt

EFS ID:	39005929
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	30-MAR-2020
Filing Date:	12-OCT-2017
Time Stamp:	13:59:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$500
RAM confirmation Number	E20203TE00510907
Deposit Account	
Authorized User	

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Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	SMTX-001-ptol85b.pdf	124841 c70c3c752962e514dabbd22b6c3079dc6b6a5de7	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	29950 3d58a335edeba2571c11b98c7b5d0bbb06921153	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	154791		

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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

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Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: LUCCHESI, Nicholas
MOZZICATO	)	
	:	Group Art Unit: 3732
Application No.: 15/730,828	)	
	:	Confirmation No. 9884
Filed: October 12, 2017	)	
	:	
For: DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM	)	
	:	

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

SUBMISSION AFTER NOTICE OF ALLOWABILITY

Sir:

This paper is submitted in response to the Notice of Allowability, mailed on January 23, 2020. In the Notice of Allowability, it was stated that Figures 1 and 2 were blurry, and that several of the Figures did not include reference numbers. In response, Applicants submit herewith a replacement set of drawings. The set of replacement drawings includes clearer versions of Figures 1 and 2, and all drawings now include reference numbers. No new matter has been introduced. Applicants hereby request that the complete set of replacement drawings submitted herewith be entered into the record.

With this response and the replacement set of drawings, it is believed that all requirements have been met and the application is now in condition for allowance. Accordingly, it is submitted that the case should be passed to issue.

No fees are believed to be due in connection with this submission. Applicants hereby claim small entity status under 37 CFR §1.27. If any additional fees are due, the Examiner is requested to contact Applicants' undersigned representative. Applicants' undersigned representative may be reached by telephone at 617-966-2374. All correspondence should continue to be directed to the listed address.

Respectfully submitted,

/Steven R. Lazar/
Steven R. Lazar
Attorney for Applicants
Registration No. 32,618

234 Broadway
Arlington, MA 02474
February 19, 2020

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

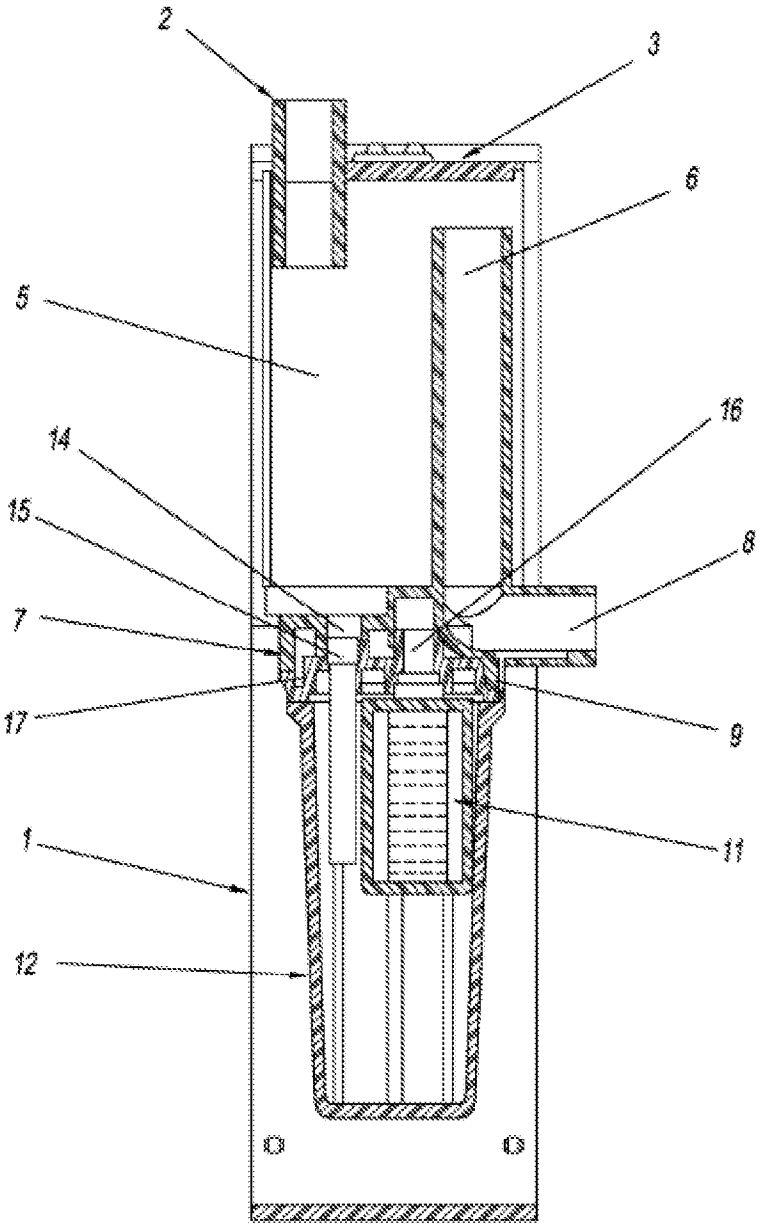

FIGURE 1

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

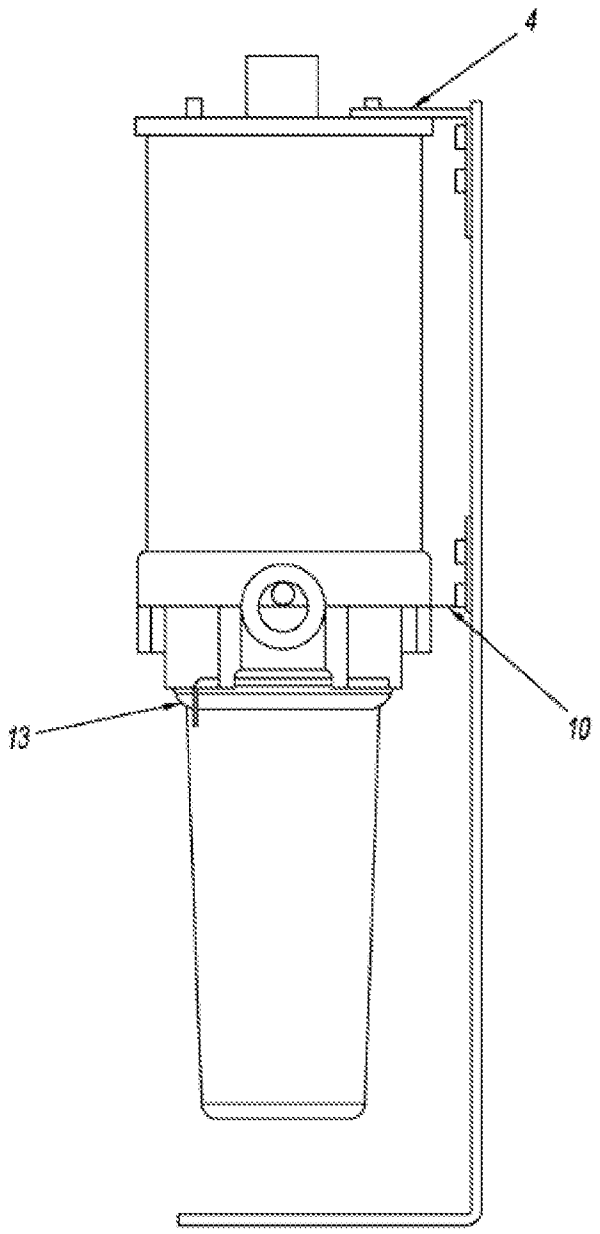

FIGURE 2

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

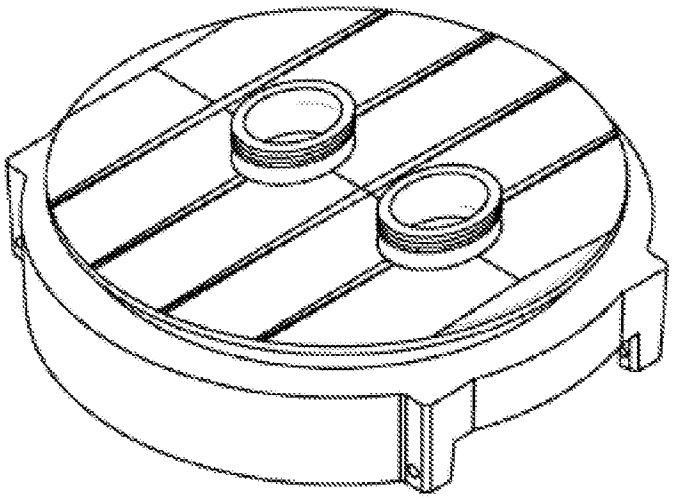

FIGURE 3A

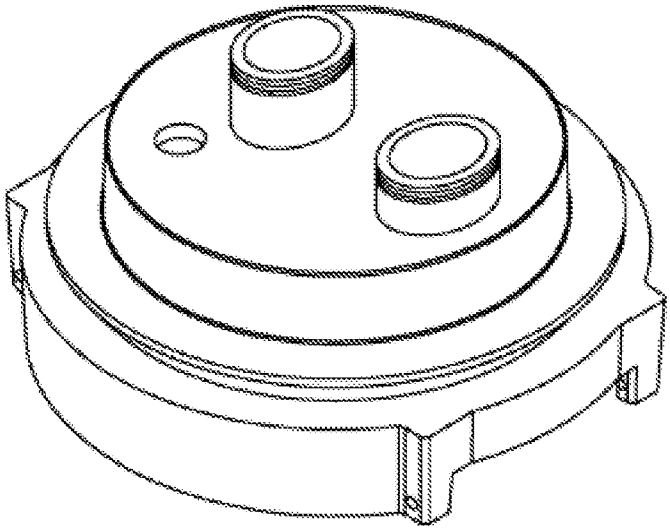

FIGURE 3B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

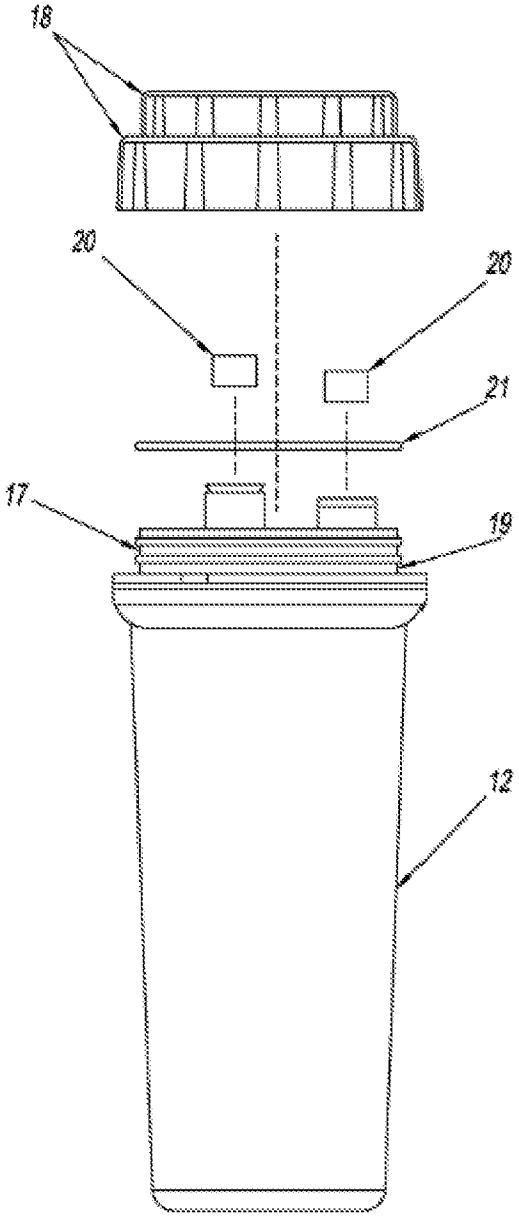

FIGURE 4A

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

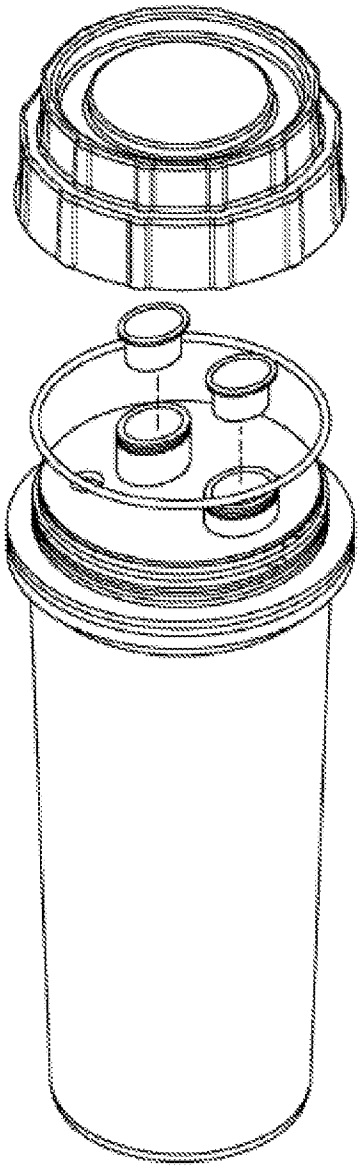

FIGURE 4B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

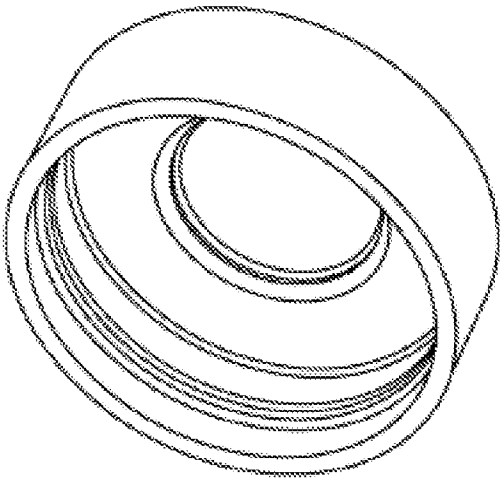

FIGURE 5A

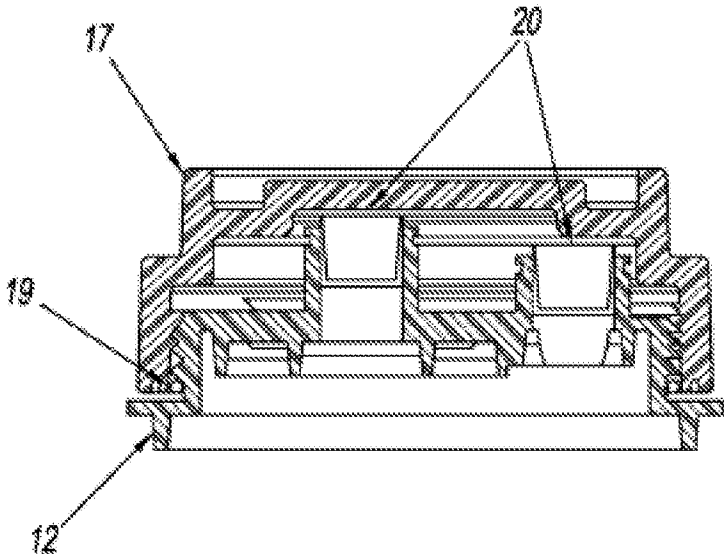

FIGURE 5B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

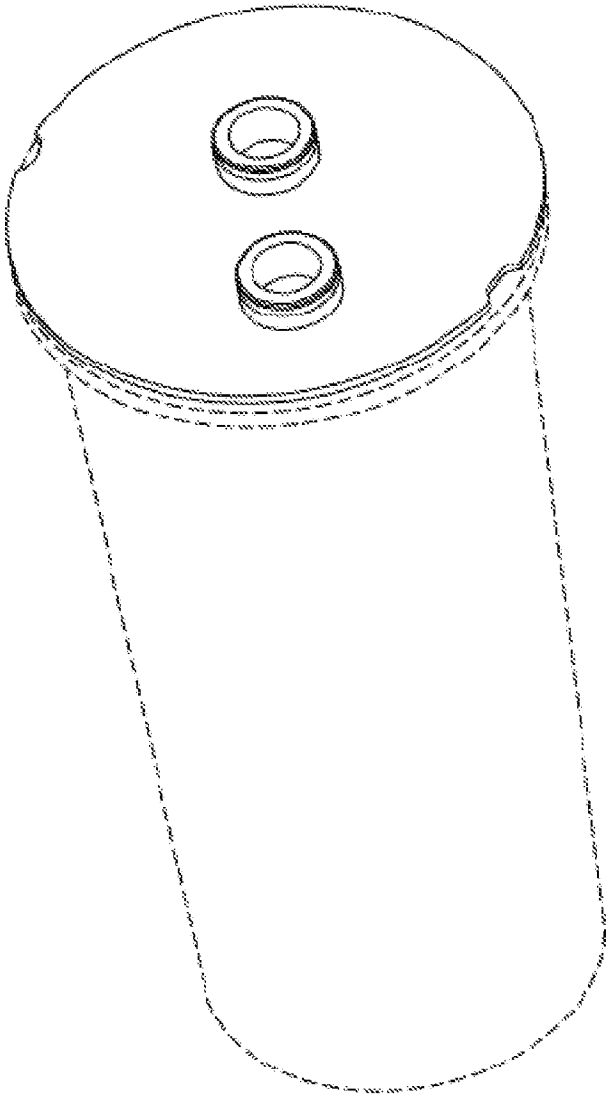

FIGURE 6A

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

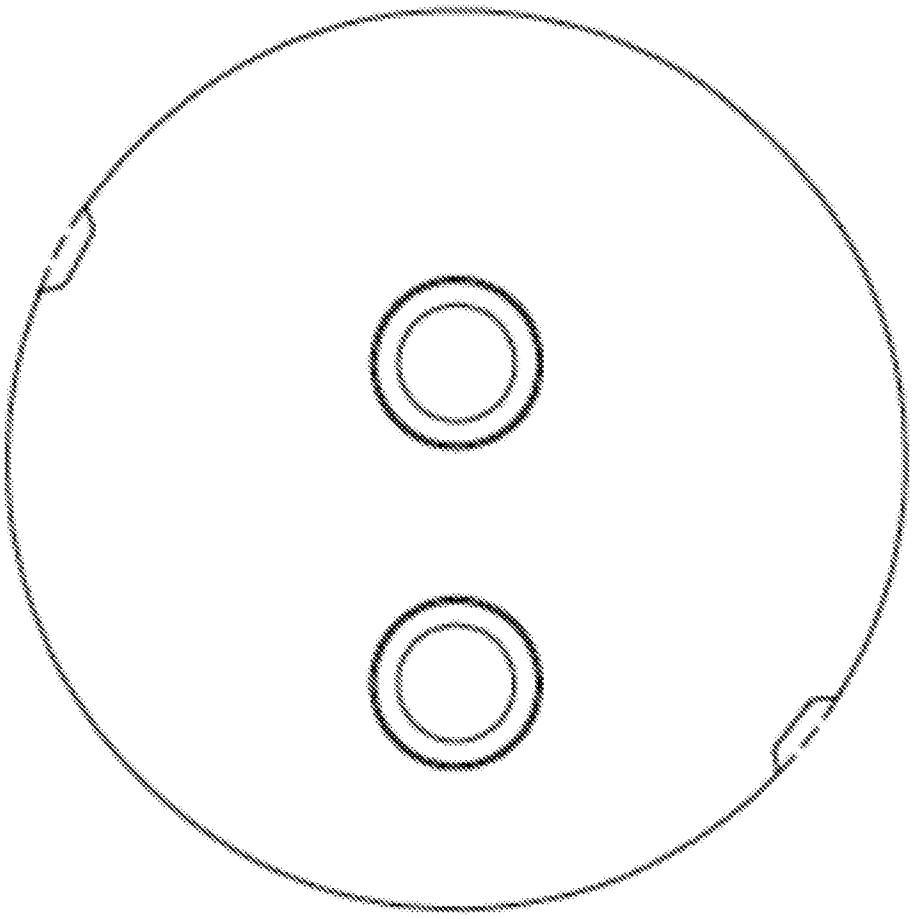

FIGURE 6B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

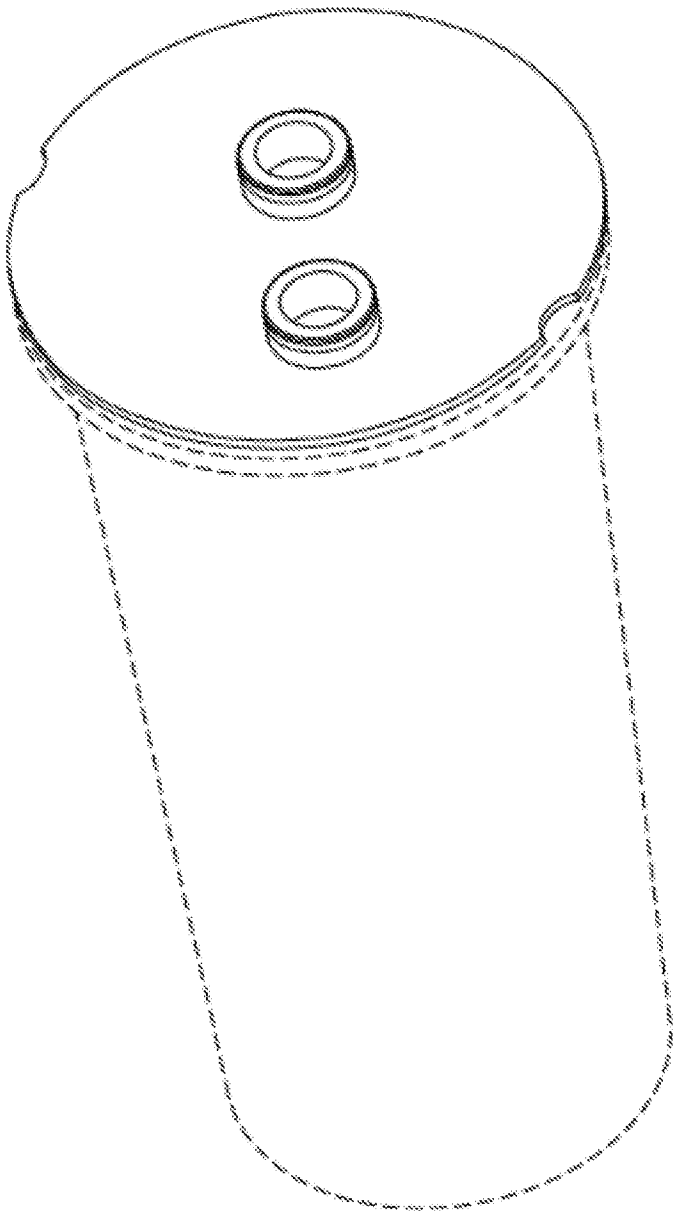

FIGURE 7A

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

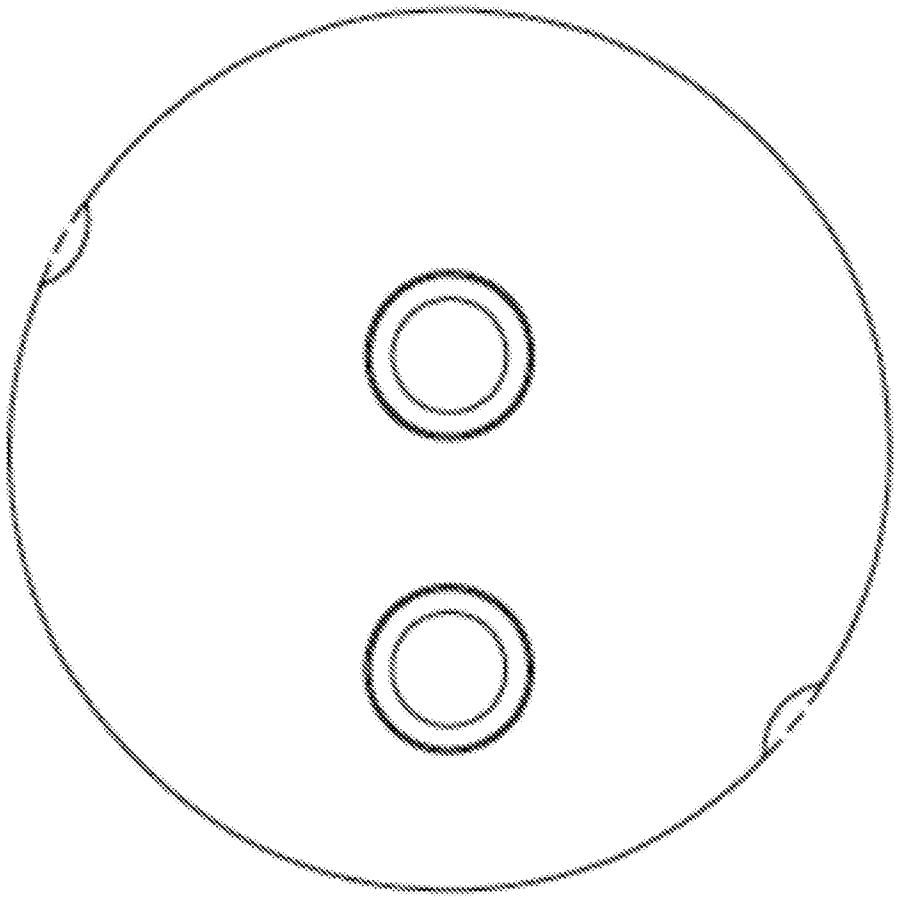

FIGURE 7B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

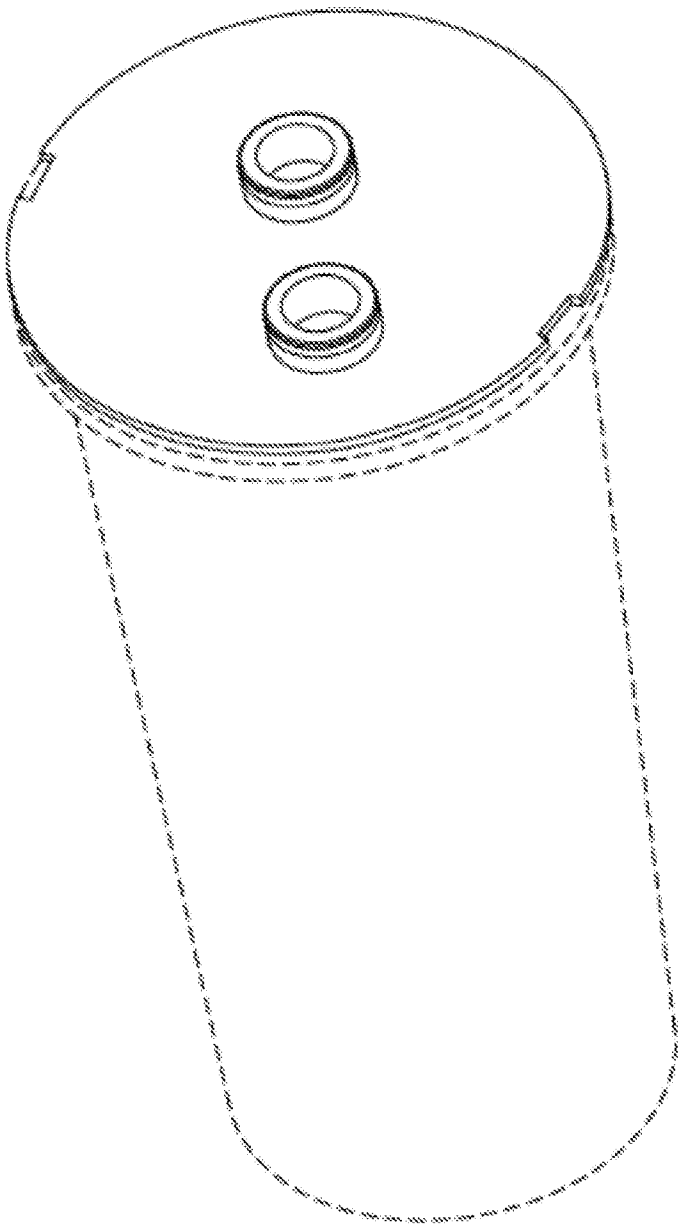

FIGURE 8A

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

REPLACEMENT SHEET

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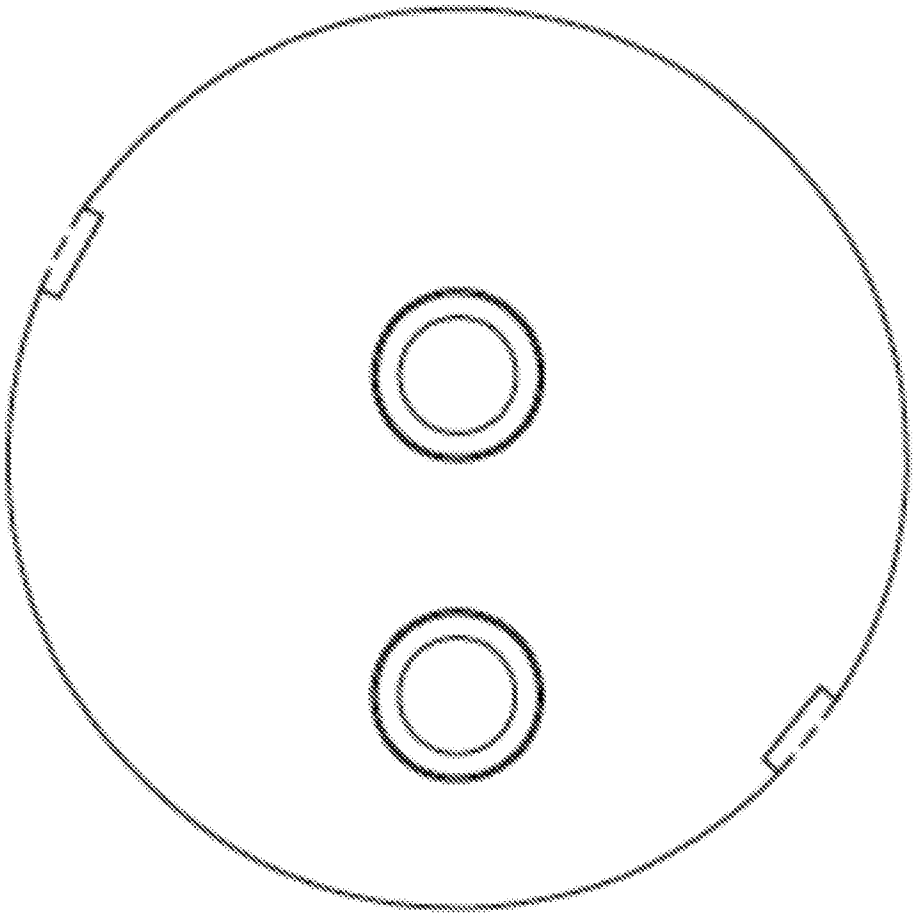

FIGURE 8B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

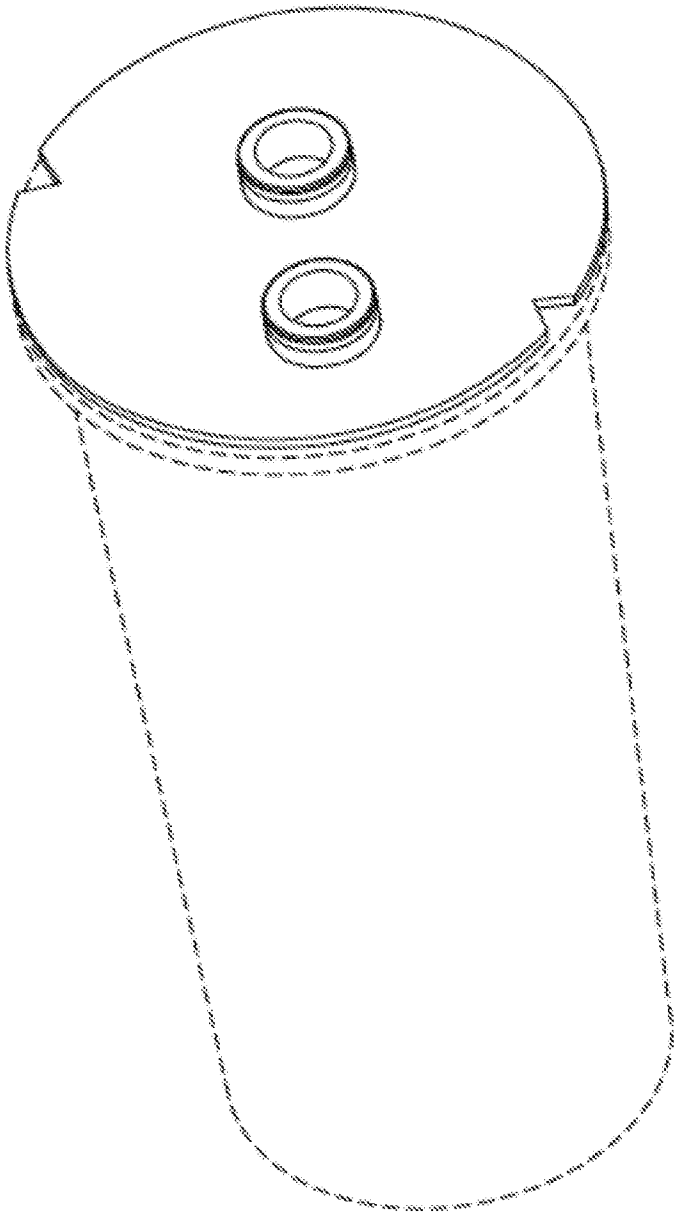

FIGURE 9A

Solmetex Ex. 2004
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REPLACEMENT SHEET

14/26

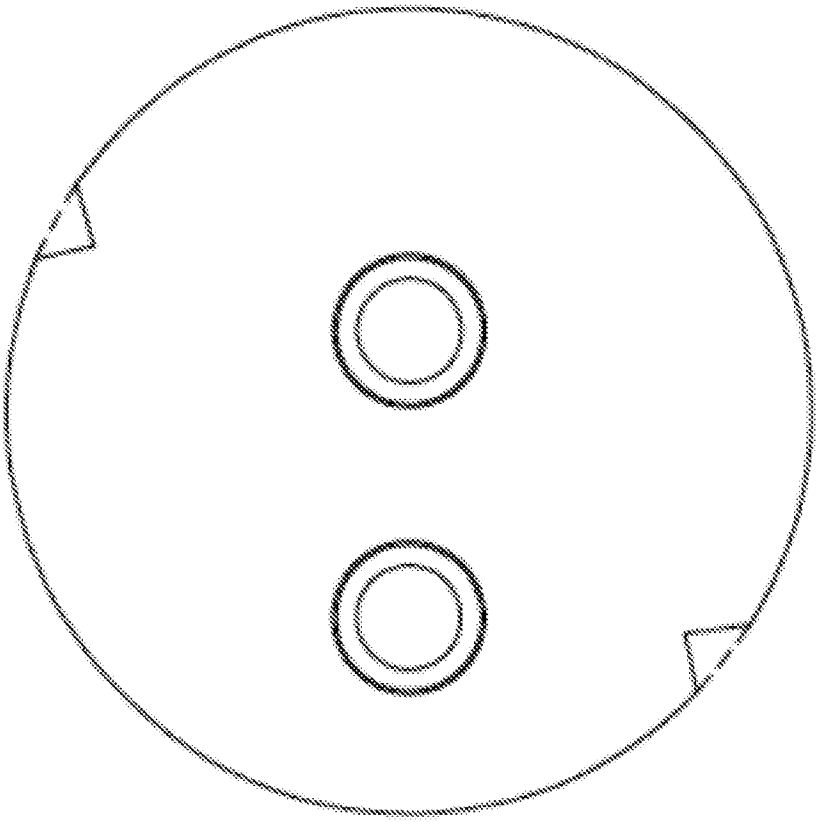

FIGURE 9B

Solmetex Ex. 2004
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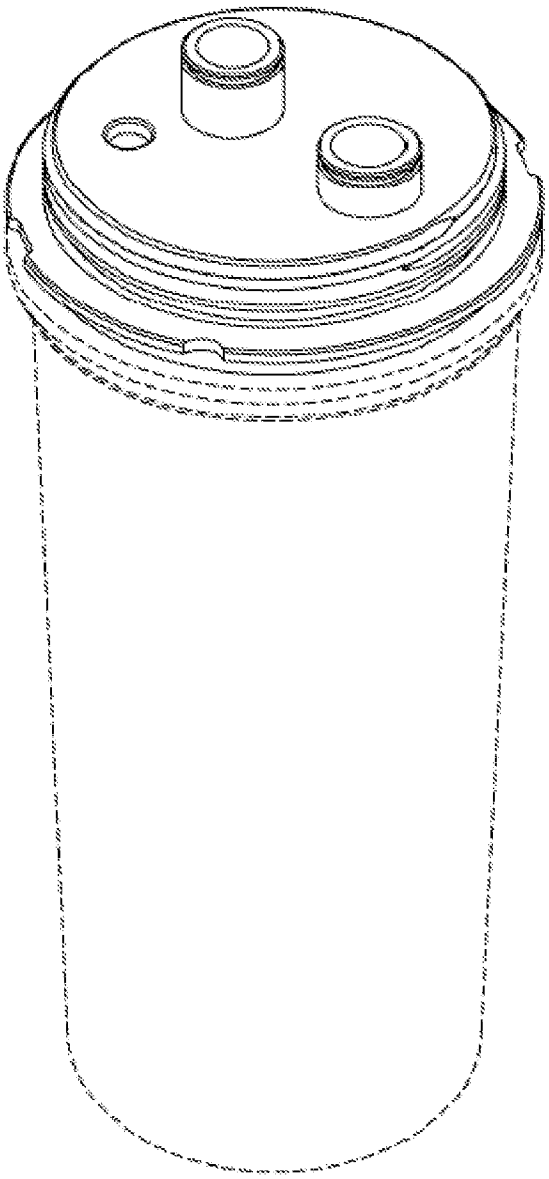

FIGURE 10A

Solmetex Ex. 2004
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REPLACEMENT SHEET

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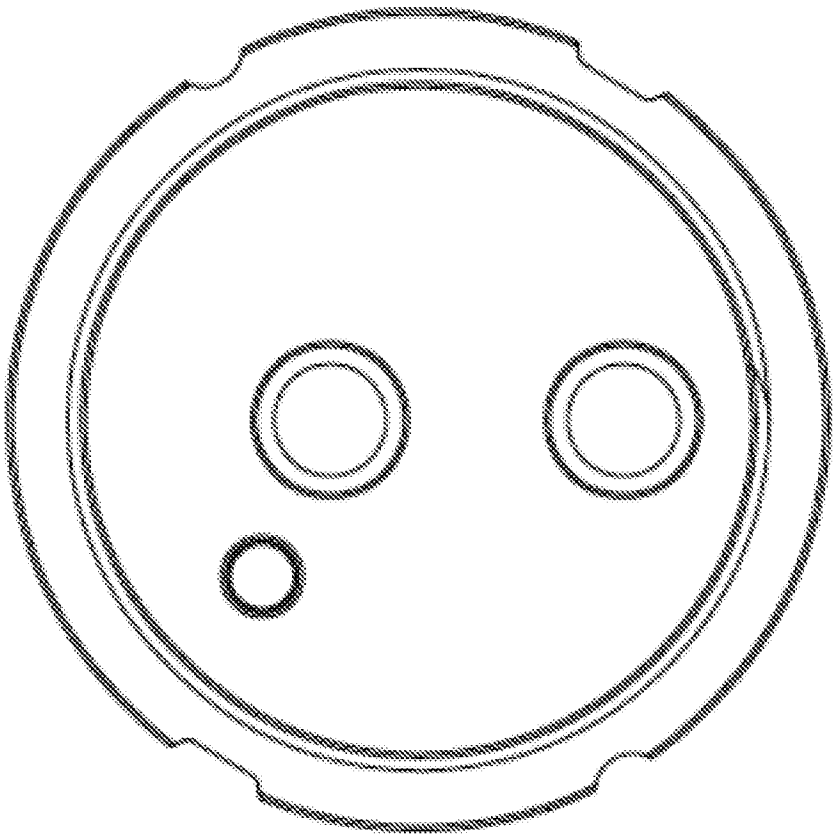

FIGURE 10B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

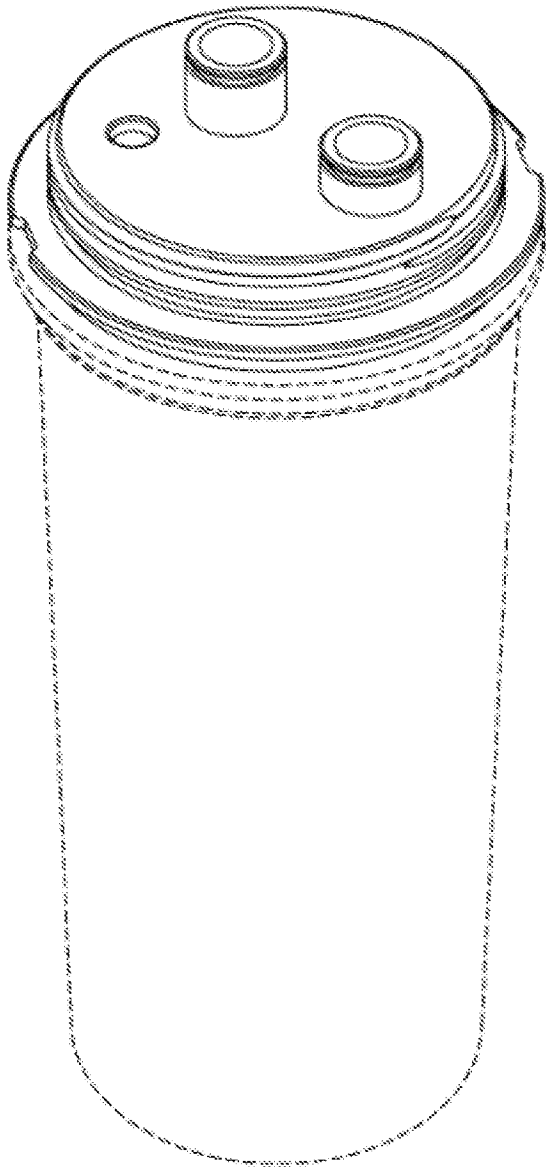

FIGURE 11A

Solmetex Ex. 2004
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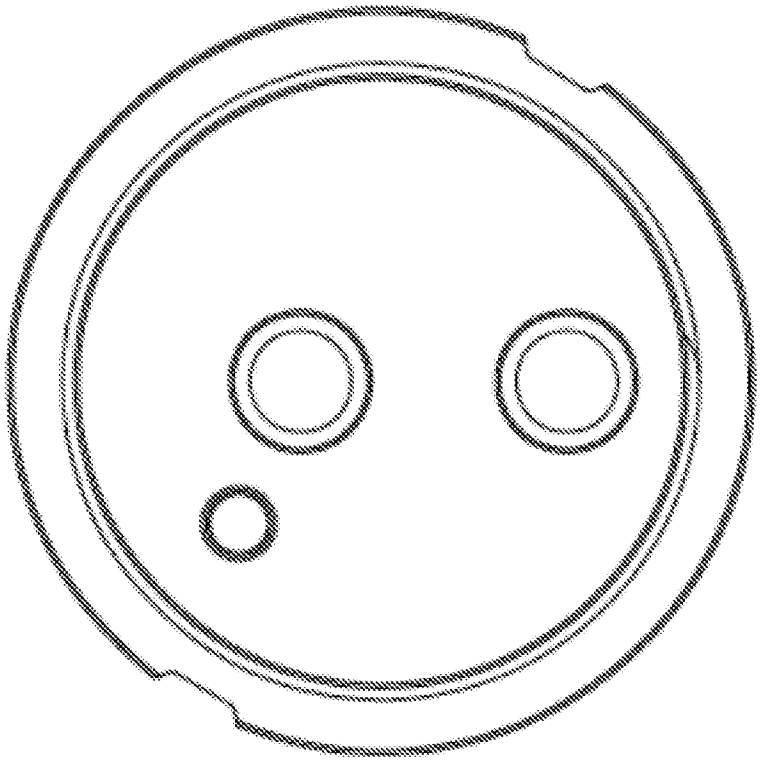

FIGURE 11B

Solmetex Ex. 2004
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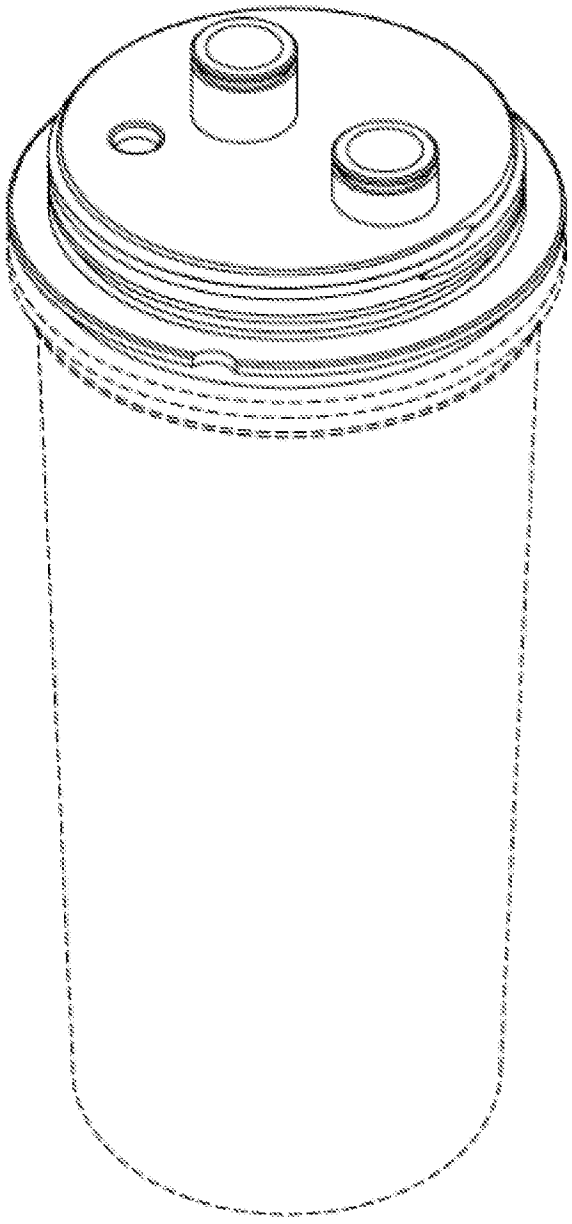

FIGURE 12A

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

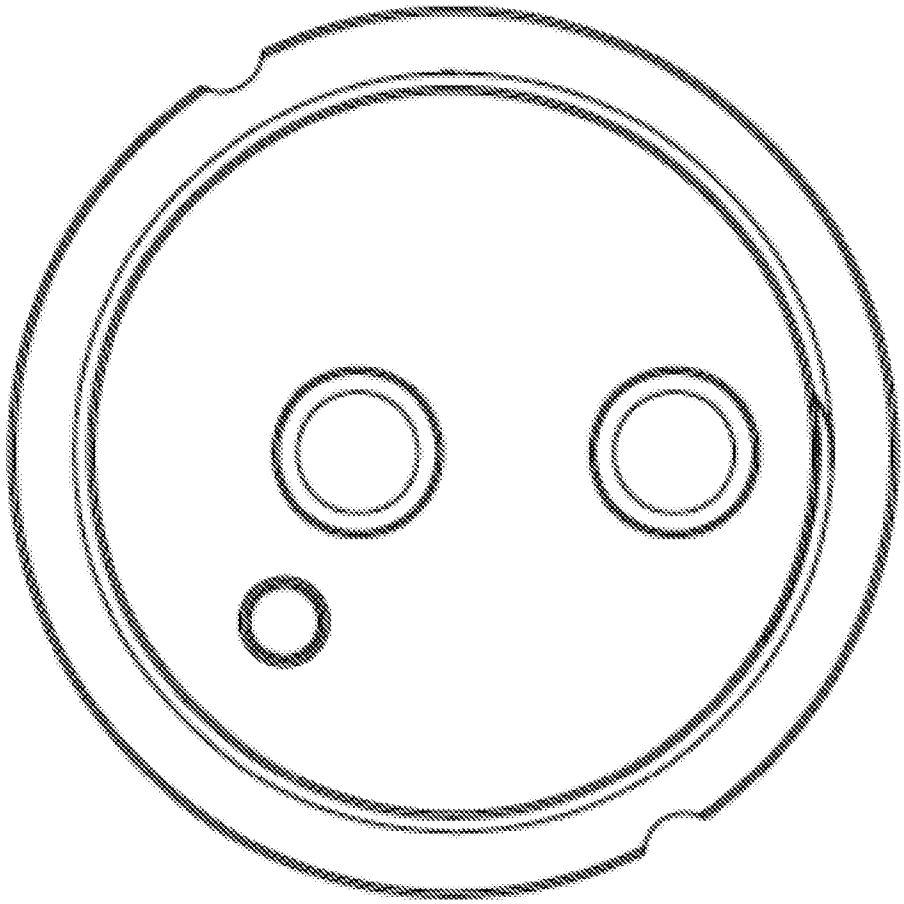

FIGURE 12B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

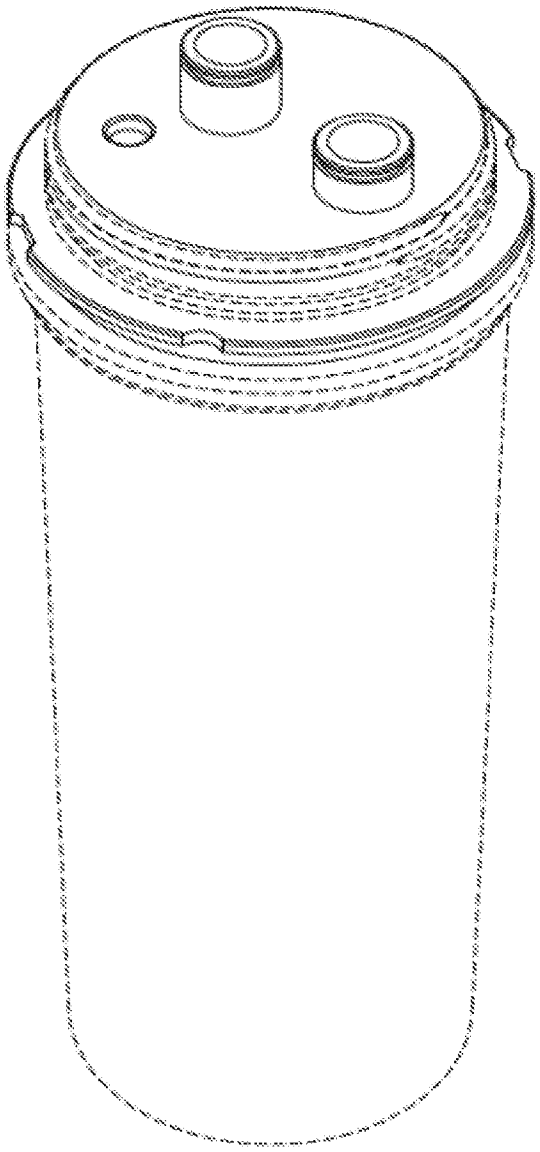

FIGURE 13A

Solmetex Ex. 2004
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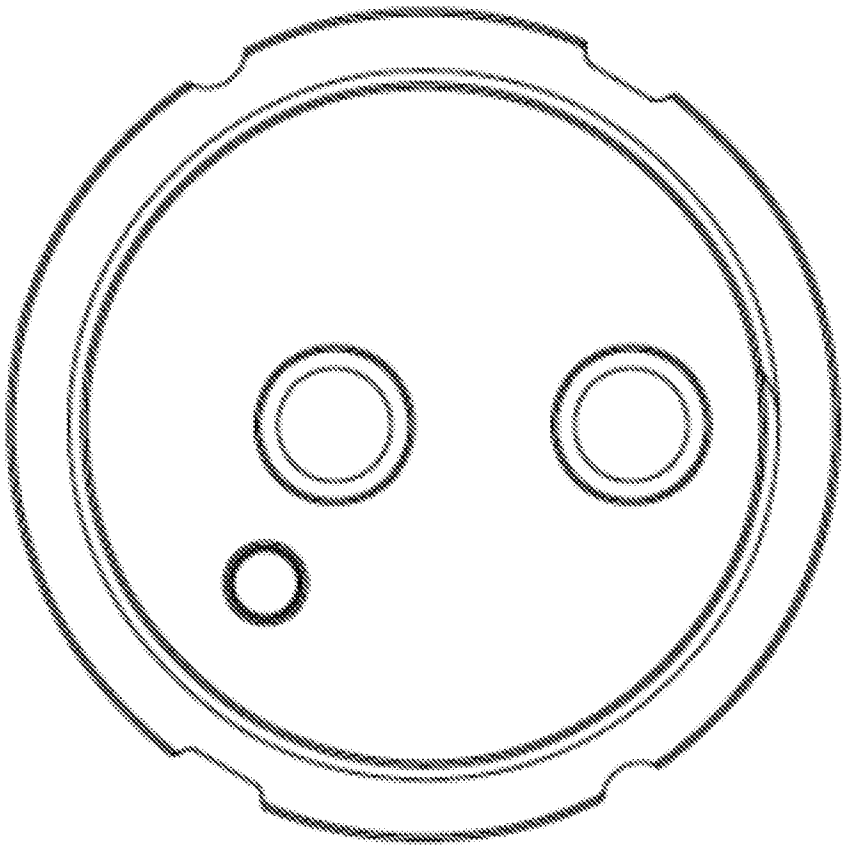

FIGURE 13B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

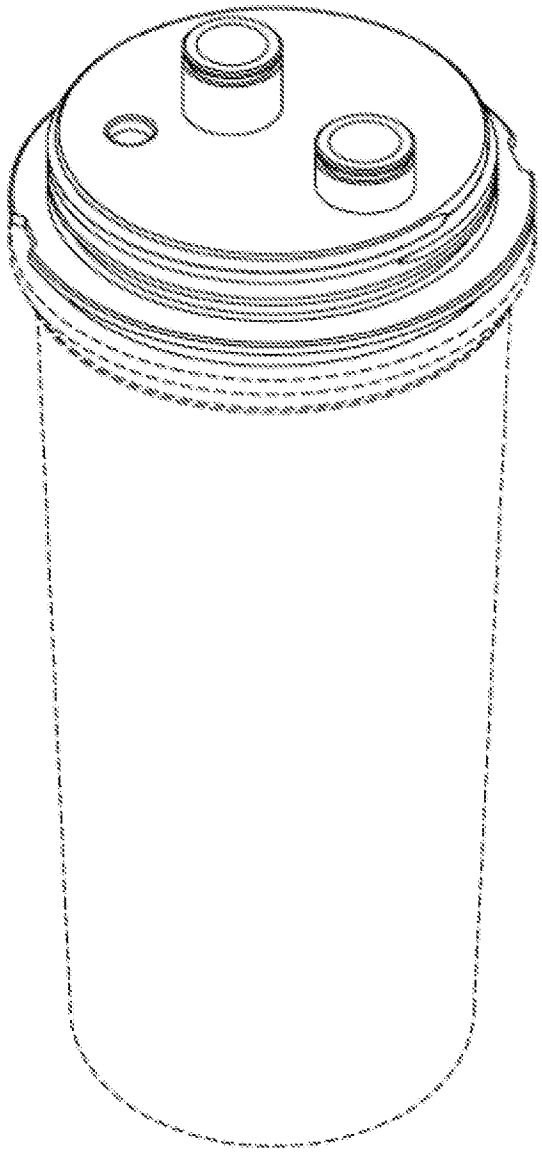

FIGURE 14A

Solmetex Ex. 2004
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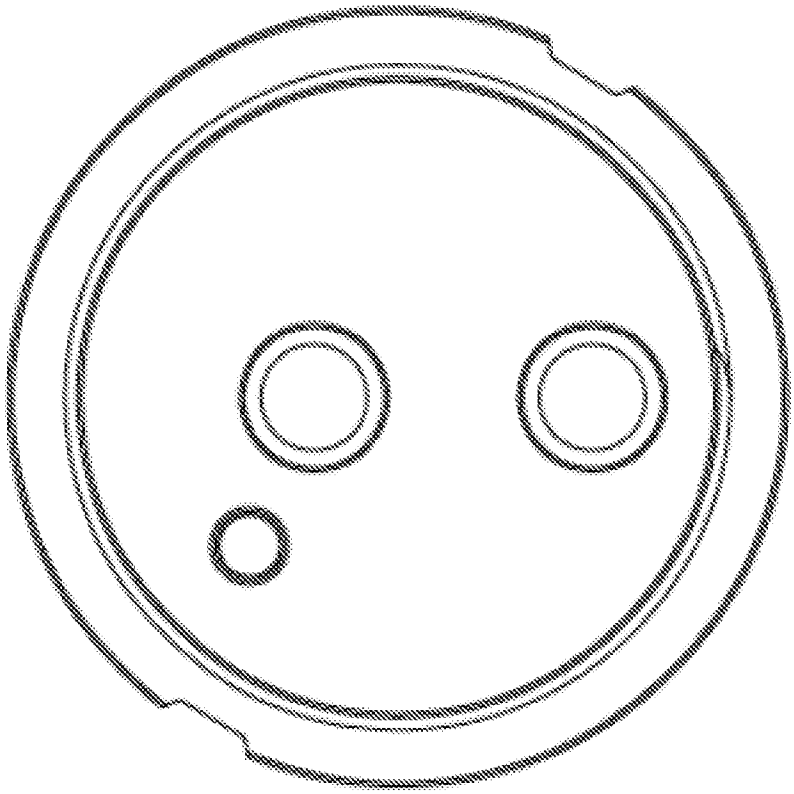

FIGURE 14B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

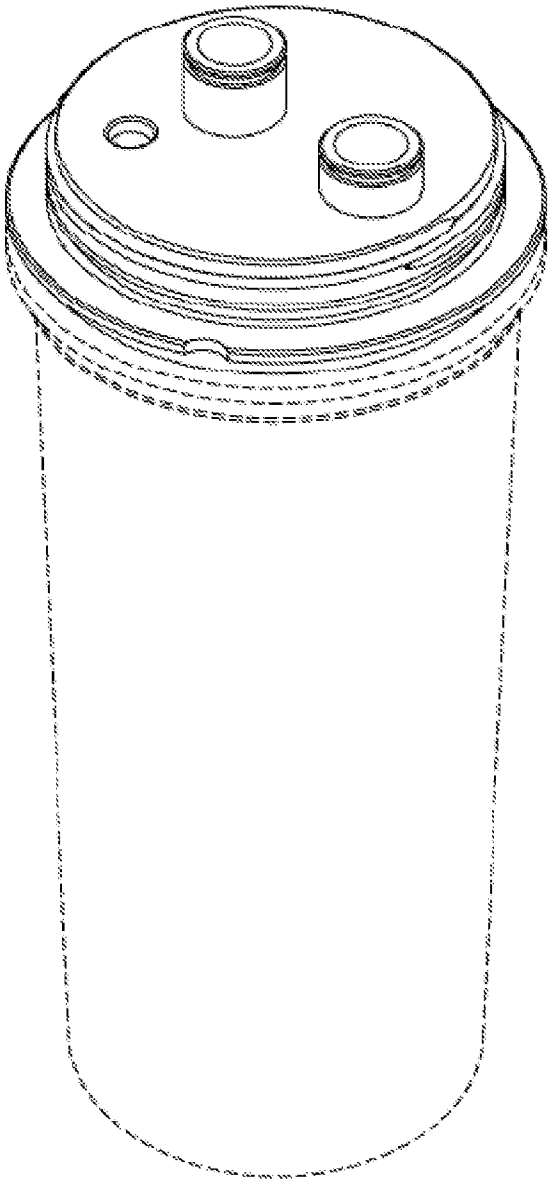

FIGURE 15A

Solmetex Ex. 2004
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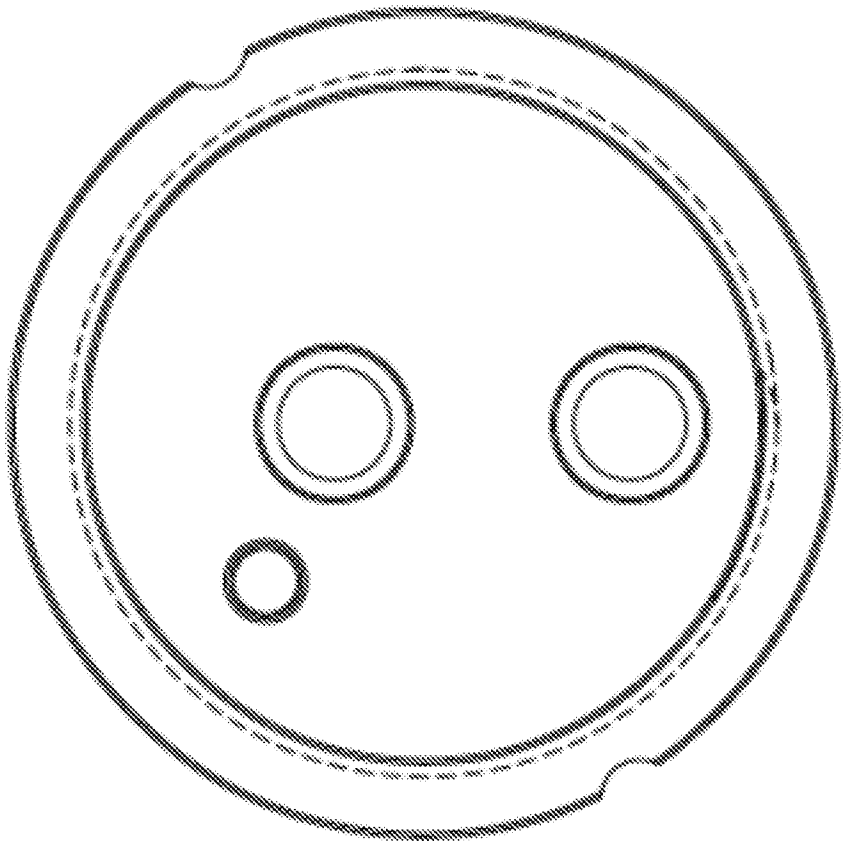

FIGURE 15B

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Electronic Acknowledgement Receipt

EFS ID:	38635265
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	19-FEB-2020
Filing Date:	12-OCT-2017
Time Stamp:	19:15:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment after Notice of Allowance (Rule 312)	SMTX-0001-Submission_After_Allow_2-19-2020.pdf	59838 dd0199fcfe62cf3c7e0f747923396006032 1fc5e	no	1

Warnings:

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Information:					
2	Drawings-only black and white line drawings	SMTX-0001-Replacement_Drawings_2-19-2020.pdf	1074880 a980380389840e19da9154fe85f1460d6e433ad1	no	26
Warnings:					
Information:					
			Total Files Size (in bytes):	1134718	

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.

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

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

80709 7590 01/23/2020

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

EXAMINER	
LUCCHESI, NICHOLAS D	
ART UNIT	PAPER NUMBER
3772	

DATE MAILED: 01/23/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US	9884

TITLE OF INVENTION: Dental Amalgam Separation and Recycling System

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	04/23/2020

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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

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DRNA v. Solmetex - PGR2023-00555

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

80709 7590 01/23/2020

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US	9884

TITLE OF INVENTION: Dental Amalgam Separation and Recycling System

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	04/23/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
LUCCHESI, NICHOLAS D	3772	433-092000

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 03-09 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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
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.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US	9884

80709 7590 01/23/2020

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

EXAMINER	
LUCCHESI, NICHOLAS D	
ART UNIT	PAPER NUMBER
3772	

DATE MAILED: 01/23/2020

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

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

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

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

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DRNA v. Solmetex - PGR2023-00555

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

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DRNA v. Solmetex - PGR2023-00555

Notice of Allowability	Application No. 15/730,828	Applicant(s) Mozzicato et al.	
	Examiner NICHOLAS D LUCCHESI	Art Unit 3772	AIA (FITF) Status Yes

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

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

1. ☑ This communication is responsive to amendment filed 10/15/19.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☑ The allowed claim(s) is/are 13-14 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

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

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

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 9/27/18.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/NICHOLAS D LUCCHESI/
Primary Examiner, Art Unit 3772

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Drawings

The drawings in this application require several revisions. Figures 1 and 2 are blurry. Also, several of the figures do not include reference numerals.

Corrections are required.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICHOLAS D LUCCHESI whose telephone number is (571)272-4977. The examiner can normally be reached on M-F 800-430.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cris Rodriguez can be reached on 571-272-4964. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NICHOLAS D LUCCHESI/
Primary Examiner, Art Unit 3772

Solmetex Ex. 2004
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/730,828	Mozzicato et al.
	Examiner	**Art Unit**
	NICHOLAS D LUCCHESI	3772

CPC						
Symbol					**Type**	**Version**
A61C	/	17	/	065	F	2019-05-01
A61C	/	5	/	66	I	2017-02-01
A61C	/	2202	/	00	A	2013-01-01

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	2	
/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	19 January 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20200119

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/730,828	Mozzicato et al.
	Examiner	**Art Unit**
	NICHOLAS D LUCCHESI	3772

INTERNATIONAL CLASSIFICATION					
CLAIMED					
A61C	/	17	/	14	
NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	2	
/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	19 January 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20200119

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/730,828	Mozzicato et al.
	Examiner	**Art Unit**
	NICHOLAS D LUCCHESI	3772

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

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10												
	2		11												
	3		12												
	4	1	13												
	5	2	14												
	6														
	7														
	8														
	9														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	2	
/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	19 January 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20200119

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/730,828	Mozzicato et al.
	Examiner	Art Unit
	NICHOLAS D LUCCHESI	3772

CPC - Searched*		
Symbol	Date	Examiner
A61C 17/046, 17/14, 5/66, 2202/00: B01D 17/00, 21/0006, 21/0012, 21/0018	7/21/2018	NL
search updated	01/19/2020	NL

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor Search	7/21/2018	NL
search updated	01/19/2020	NL

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
A61C	17/046, 17/14, 5/66, 2202/00: B01D 17/00, 21/0006 , 21/0012, 21/0018	01/19/2020	NL

/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L3	344	A61C5/66.cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L4	253	A61C2202/00.cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L5	943	B01D17/00.cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L6	0	B01D21/0006cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L7	559	B01D21/0006.cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L8	1384	B01D21/0012.cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L9	467	B01D21/0018.cpc.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L10	3620	L1 or L2 or L3 or L4 or L5 or L6 or L7 or L8 or L9	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L11	18	L10 and dental and amalgam and separator	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L12	7	L11 and (recycle or recycling)	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L13	5	L12 and (cap or lid)	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L14	1	L13 and (threads or threaded)	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L15	1	"7156214".pn.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L16	1	"6409803".pn.	US-PGPUB;	OR	OFF	2020/01/19 20:30

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DRNA v. Solmetex - PGR2023-00555

			USPAT			
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L20	16	("0054414" | "1032879" | "2467547" | "4326952" | "4385891" | "4761235" | "4957621" | "5114578").PN. OR ("6592769").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/01/19 20:30
L21	8	mozzicato adj2 nicholas.in.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L22	9	goulston adj2 richard.in.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L23	2	schofield adj2 robin.in.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
L24	5	toole adj2 michael.in.	US-PGPUB; USPAT	OR	OFF	2020/01/19 20:30
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EAST Search History (Interference)

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L28	154	A61C2202/00.cpc.	US-PGPUB	OR	OFF	2020/01/19 20:39
L29	227	B01D17/00.cpc.	US-PGPUB	OR	OFF	2020/01/19 20:40
L30	198	B01D21/0006.cpc.	US-PGPUB	OR	OFF	2020/01/19 20:40
L31	434	B01D21/0012.cpc.	US-PGPUB	OR	OFF	2020/01/19 20:40
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BIB DATA SHEET

CONFIRMATION NO. 9884

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/730,828	10/12/2017	433	3772	SMTX-001-US

APPLICANTS
Solmetex LLC, Northbridge, MA

INVENTORS
Nicholas Mozzicato, Acton, MA;
Richard Goulston, Stuart, MA;
Robin Schofield, Lancaster, MA;
Michael Toole, Norton, MA;

**** CONTINUING DATA ***************************
This appln claims benefit of 62/406,990 10/12/2016
and claims benefit of 62/414,712 10/29/2016

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
10/25/2017

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /NICHOLAS D LUCCHESI/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		MA	6	12	2

ADDRESS
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474
UNITED STATES

TITLE
Dental Amalgam Separation and Recycling System

FILING FEE RECEIVED		
800	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

BIB (Rev. 05/07).

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DRNA v. Solmetex - PGR2023-00555

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

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

(Not for submission under 37 CFR 1.99)

Application Number	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

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
/N.D.L/	1	6592769		2003-07-15	Erickson	
/N.D.L/	2	6409803		2002-06-25	Tremel	
/N.D.L/	3	6592754		2003-07-15	Chilibeck	
/N.D.L/	4	6692636		2004-02-17	Chilibeck	
/N.D.L/	5	7306460		2007-12-11	Hubner	
/N.D.L/	6	4753632		1988-06-28	Duerr Dental	
/N.D.L/	7	5330641		1994-07-19	Cattani	
/N.D.L/	8	5797742		1998-08-25	Fraker	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

/N.D.L/	9	6946069		2005-09-20	Chilibeck	
/N.D.L/	10	5613851		1997-03-25	Trawoeger	
/N.D.L/	11	5795159		1998-08-18	Ralls	
/N.D.L/	12	8636837		2014-01-28	Duerr Dental	
/N.D.L/	13	5018971		1991-05-28	Trawoeger	
/N.D.L/	14	4097381		1978-06-27	Ritzler	
/N.D.L/	15	5421996		1995-06-06	Trawoeger	
/N.D.L/	16	7767079		2010-08-03	Darcy	
/N.D.L/	17	6790038		2004-09-14	Hubner	
/N.D.L/	18	7166214		2007-01-23	Armstrong	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

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
/N.D.L/	1	20100264074		2010-10-21	Darcy	
/N.D.L/	2	20060065594		2006-03-30	Armstrong	
/N.D.L/	3	20050016913		2005-01-27	Giesel	
/N.D.L/	4	20010047956		2001-12-06	Albiston	
/N.D.L/	5	20140154641		2014-06-05	Bogen	

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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]
/N.D.L/	1	EP1366728	EP		2003-12-03	Bartocci		
/N.D.L/	2	CA2442513	CA		2005-03-23	Barrett		
/N.D.L/	3	WO2018006106	WO		2018-01-11	Ghazaryan		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

/N.D.L/	4	WO1994016643	WO		1994-08-04	Trawoeger		
/N.D.L/	5	WO1983002720	WO		1983-08-18	Horn-Lassen		

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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		

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

EXAMINER SIGNATURE

Examiner Signature	/NICHOLAS D LUCCHESI/	Date Considered	01/19/2020

*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	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

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	/Steven R. Lazar/	Date (YYYY-MM-DD)	2018-09-27
Name/Print	Steven R. Lazar	Registration Number	32,618

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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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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Electronic Patent Application Fee Transmittal

Application Number:	15730828
Filing Date:	12-Oct-2017
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
			Total in USD ($)	**700**

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Electronic Acknowledgement Receipt

EFS ID:	37466668
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	15-OCT-2019
Filing Date:	12-OCT-2017
Time Stamp:	22:46:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$700
RAM confirmation Number	E20190EM48266534
Deposit Account	
Authorized User	

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	Extension of Time	SMTX-0001-PETEXT_10-15-2019.pdf	55694 337fa95e0c11f2b1b6546b98d35b7d3752e0a53d	no	1
Warnings:					
Information:					
2		SMTX-0001-OA-Response_10-15-2019.pdf	125277 5f101128c1493136a5727311b4c63412ae6a89e3	yes	11

Multipart Description/PDF files in .zip description

Document Description	Start	End
Applicant Arguments/Remarks Made in an Amendment	5	11
Claims	4	4
Amendment/Req. Reconsideration-After Non-Final Reject	1	3

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30190 e3512c596a85f3da7b69e492be5e181f99dbc582	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	211161		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: LUCCHESI, Nicholas
MOZZICATO	)	
	:	Group Art Unit: 3732
Application No.: 15/730,828	)	
	:	Confirmation No. 9884
Filed: October 12, 2017	)	
	:	
For: DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM	)	
	:	

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

PETITION FOR EXTENSION OF TIME

Sir:

Applicants hereby file this petition for a three-month extension of time for response to the Notice of Non-Compliant Amendment, mailed on May 14, 2019, together with the required extension fee, to extend the time for response until October 15, 2019 (October 14, 2019 being a Federal Holiday. Applicants hereby claim small entity status under 37 CFR §1.27.

Respectfully submitted,

/Steven R. Lazar/

Steven R. Lazar
Attorney for Applicants
Registration No. 32,618

SRL Patents
234 Broadway
Arlington, MA 02474
October 15, 2019

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CLAIMS:

Please amend the claims as follows:

Cancel Claims 1 through 12.

Add new claims 13 and 14 as follows:

13. (New) A dental amalgam separation system for removing and collecting particles from a dental liquid effluent drawn by means of a vacuum, comprising:

(a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with a vacuum external to the air-water separator tank, an air-water separator tank liquid effluent outlet and an air-water separator tank air outlet;

(b) a detachable collection container, said collection container acting primarily under the influence of gravity to cause sedimentation of said particles, and having a collection container inlet port detachably connected to said air-water separator tank liquid effluent outlet, and said collection container also having an effluent outlet port;

(c) wherein the air-water separator tank further comprises a suction conduit;

(d) wherein the collection container effluent inlet port and the collection container outlet port are not the same height;

(e) wherein the collection container comprises one or more keyways cast into its outside top mating surface of said collection container; and

(f) said air-water separation tank has one or more corresponding keys cast into its mating surface, such that the keys of the air-water separation tank must be aligned with the keyways of said collection container in order for said collection container and said air-water separation tank to mate securely.

14. (New) The dental amalgam separation system of claim 13, further comprising a shipping cap, wherein said shipping cap can be connected securely with the collection container, when the collection container effluent inlet port is detached from said air-water separator tank liquid effluent outlet.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: LUCCHESI, Nicholas
MOZZICATO	)	
	:	Group Art Unit: 3732
Application No.: 15/730,828	)	
	:	Confirmation No. 9884
Filed: October 12, 2017	)	
	:	
For: DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM	)	
	:	

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

RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT

Sir:

In response to the Notice of Non-Compliant Amendment, mailed on May 14, 2019, a petition for a three-month extension of time for response being filed along herewith, extending such time for response until October 15, 2019 (October 14, 2019 being a Federal Holiday), Applicants respond as follows:

1. Applicants submit herewith the $700.00 fee for a three-month extension of time, (small entity), to extend the time to respond until May 15, 2019.
2. Amendments to the Specification begin on page 2.
3. Amendments to the Drawings begin on page 3.
4. Amendments to the Claims begin on page 4.
5. Remarks begin on page 5.

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IN THE SPECIFICATION:

With its earlier response mailed on January 28, 2019, Applicants submitted substantial amendments to the specification, along with a substitute specification, in both marked and unmarked forms, as specified in 37 C.F.R. §1.125.

Applicants hereby request that the amendments and substitute specification submitted with its January 28, 2019 submission, be entered into the record.

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AMENDMENTS TO THE DRAWINGS:

Please add new Figures 6 through 15.

A complete set of replacement drawings was submitted by Applicants with its prior response filed on January 28, 2019, with the drawings indicated to be "Replacement Sheet" or "New Sheet" as applicable. New Figures 6 through 15 were incorporated from earlier file patent application serial number 29/577,701, filed on September 14, 2016, to which the present application claims priority.

No new matter is introduced as a result of the above amendments and new drawings, as they are fully supported by the priority documents recited herein.

Applicants hereby request that the complete set of replacement drawings submitted on January 28, 2019, be entered into the record.

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REMARKS

Applicants submit this response to the Notice of Non-Compliant Amendment ("Notice"), which was mailed on May 14, 2019. A petition for a three-month extension of time to respond has been filed, along with the appropriate extension fee, in the amount of $700.00. Applicants hereby claim small entity status under 37 CFR §1.27.

The claims are 13 and 14. Claims 1 through 12 have been canceled. Claims 13 and 14 are new. Claims 11 and 12 been in large part rewritten as new claims 13 and14. Claims 13 and 14 incorporate the limitations of claims 1 and 2, respectively, with the following exceptions:

In order to more distinctly claim the invention, Applicants have replaced certain claim terms as follows:

The term 'recycling system' has been replaced by the term 'separation system.' Support for the term 'separation system' is found throughout the specification, including paragraphs 0011; 0017; 0032; 0045 and 0088-0089.

The term 'recycling container' has been replaced by the term 'collection container.' Support for the term 'collection container is found throughout the specification, including paragraphs 0016-0018; 0032 and 0093.

The term 'recycling particles' has been replaced by the term 'removing and collecting particles.' Support for the term 'removing and collecting particles' is found throughout the specification, including paragraphs 0008-011; and 0082-0083.

The term 'suctioning device' has been replaced by the term 'vacuum.' Support for the term 'vacuum' is found throughout the specification, including paragraphs 0011; 0027; 0048; 0083; 0088-0093 and 0100.

The term 'settlement of said particles' has been replaced by the term 'sedimentation of said particles.' Support for the term 'sedimentation of said particles' is found throughout the specification, including paragraphs 0084-0089; 0094; and 0098-0099.

The term 'detachably' has been added to modify 'connected.' Support for the term 'detachably connected' is found throughout the specification, including paragraphs 0022; 0052; 0062; 0064; 0066; 0068; 0070; 0072; 0074; 0076; 0078; 0080; 0085; 0089; and 0092-0093.

In claim 13, the recitation of claim 1 that the collection container comprises threads has not been maintained. In the claimed embodiment, the keys present on the air-water separation tank, and the keyways present on the collection container serve to provide for secure mating of the air-water separation tank to the collection container, and no threads are present.

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The claim term 'irregular keyways' has not been maintained. Rather the term 'corresponding keys' is used to indicate that the keys and the keyways need to be aligned in order for the air-water separation tank and the collection container to mate securely. Support for the claim term 'corresponding keys' is found in the specification at paragraph [0031].

No new matter has been added.

Notice of Non-Conforming Amendment

In the Notice the Examiner pointed out several instances of defective language in the amended claims. The Applicants thank the Examiner for his careful review. It was pointed out that claim 6 did not include all of the canceled language from the previously filed claim 6, and that claim 7 was unclear as to the language that was intended to be canceled. Claims 6 and 7 have both been canceled, obviating these objections.

Claim Rejections Under 35 U.S.C. §112

In the original office action, several of the claims have been rejected under 35 U.S.C. §112, for various objections that were stated to render the claims indefinite. The Examiner is thanked for his careful examination. These rejections were addressed as follows.

Claim 1 was rejected in its recitation that the suctioning device is in fluid communication with the tank inlet, while the suctioning device is only functionally recited, rendering claim 1 unclear as to whether it is being positively claimed. In new claim 13, it is recited that the dental liquid effluent is drawn by means of a vacuum recited to be external to the air-water separator tank. It is clearly stated at paragraphs [0062] to [0070] that the vacuum is upstream of the of the amalgam separator apparatus, and the apparatus of the invention can be installed in a dental office using a pre-existing suction/vacuum pump system. Hence, the suction/vacuum system is not a required element of the present system. Accordingly, this ground of rejection should not be applied to the new claims.

Claim 2, line 2 was rejected as incomplete, which has been canceled.

In Claims 4 and 5, line 2, 'said shipping cap' was stated to lack prior antecedent basis. To correct this error, new claim 14 affirmatively recites the presence of a shipping cap. Accordingly, this ground of rejection should not be applied to the new claims.

Claim 7 was stated to be unclear. Claim 7 has been canceled, obviating this ground of rejection.

Claims 11 and 12 were stated to be unclear in reciting "its outside top mating surface" and "its mating surface," which had no antecedent basis. To correct these errors, new claim 13, affirmatively recites that the collection container comprises a top mating surface, and that the air-

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water separator tank comprises a mating surface. Thus, these grounds of rejection have been obviated.

Claim 9 was rejected under 35 U.S.C. §112(d) as failing to further limit the subject matter of the claim upon which it depends. This claim has been canceled, obviating this ground of rejection.

Claim Rejections Under 35 U.S.C. §102

Erickson:

Claim 6 was rejected under 35 U.S.C. §102(a)(1) as being anticipated by Erickson US 6,592,769. It was asserted that Erickson teaches a dental amalgam recycling container, comprising threads for attachment of a shipping cap. While Applicants do not agree with the rejection, in the interest of expediting prosecution, claim 6 has been canceled, thus obviating this ground of rejection.

Hubner:

Claims 9 and 10 were rejected under 35 U.S.C. §102(a)(1) as being anticipated by Hubner et al. '052. It was asserted that Hubner discloses a separator system, which includes an adaptor [90, 100] that enables a recycling container [52] to be connected to a separator tank. Claims 9 and 10, relating to an adaptor, have been canceled, thus obviating this ground of rejection.

Claim Rejections Under 35 U.S.C. §103

Erickson:

Claims 7 and 8 were rejected under 35 U.S.C. §103 as being unpatentable over Erickson (US 6,592,769). While Applicants do not agree with the rejection, in the interest of expediting prosecution, claims 7 and 8 have been canceled, thus obviating this ground of rejection.

Darcy and Erickson:

Claims 1-5 were rejected 35 U.S.C. §103 as being unpatentable over Darcy (US 2010/0264074), in view of Erickson. Claims 1-5 have been canceled, obviating this ground of rejection. To the extent that this ground of rejection might be applied to new claims 13 and14, Applicant submits that this ground of rejection is erroneous and should be withdrawn for the following reasons.

With regard to claim 1, it was asserted that Darcy discloses a dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device (paragraph 19), comprising various elements of Applicants' invention:

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(a) an air-water separator tank for receiving the effluent (paragraph 32), said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device, an air-water separator tank liquid effluent outlet (paragraphs 31 and 37) and an air-water separator tank air outlet [20];

(b) a detachable recycling container [26], said recycling container acting primarily under the influence of gravity to cause settlement of said particles (paragraph 41); said recycling container having a recycling container effluent inlet port [48] connected to said air-water separator tank liquid effluent outlet [46]; and said recycling container further having an effluent outlet port [20];

(c) wherein the air-water separator tank also includes an internal suction conduit [60];

(d) wherein the recycling container comprises a mechanical connection [23] (paragraph 33)

(e) wherein the recycling container [26], effluent inlet port [48], and the recycling container outlet port [56] are not of the height [Figure 1, which is asserted to show [48] and [56] at different heights].

Darcy was admitted not to disclose where the recycling container comprises threads. Erickson was asserted to disclose wherein the recycling container comprises threads [17] (column 6). It was asserted that it would have been obvious to one of ordinary skill in the art to modify to provide threads on the collection tank of Darcy, as taught by Erickson, if one wished to provide for easy separation and removal of the collection tank.

With respect to claim 2, Darcy/Erickson were asserted to disclose the dental amalgam recycling system according to claim 1, with Erickson further asserted to disclose a threaded shipping cap for said recycling container (Figure 2, and column 7).

With respect to claim 3, Darcy/Erickson were asserted to disclose the dental amalgam recycling system according to claim 1, with Erickson further asserted to disclose a lid [14] (column 7, lines 11-13) and a plug (stop). It was admitted that Darcy/Erickson do not specify further comprising a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port. However, it was asserted that it would have been obvious to one of ordinary skill in the art to use a plug to close both the inlet port and outlet port to provide additional seal to the recycling container of Darcy/Erickson.

With respect to claim 4, Darcy/Erickson were asserted to disclose the dental amalgam recycling system according to claim 3. It was admitted that Darcy/Erickson do not specify that first and second plugs are held tightly in place by said shipping cap when said shipping cap is fitted in place. However, it was asserted that it would have been obvious to one of ordinary skill to use the threaded shipping lid to hold the first and second plugs in place in order to provide an additional seal in order to ensure that potentially hazardous material is not released.

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With respect to claim 5, Darcy/Erickson were asserted to disclose the dental amalgam recycling system according to claim 4. It was asserted that Darcy further discloses an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place [paragraph 33].

The above grounds of rejection are traversed for the following reasons. New claims 13 and 14 recite a dental amalgam separation system that includes 'a detachable collection container.' Darcy does not disclose a 'detachable collection container.' Rather, Darcy contains a "removable plastic inner basket 14" or inner sleeve, from which "the contents of the inner sleeve can then be readily dumped into container." [Darcy paragraph 0027].

The rejection apparently considers that the sedimentation chamber (26) of Darcy constitutes a detachable collection container. This is not correct. In Figure 2 of Darcy, it is seen that detachment of the lid (22) leaves the base (32). The base (32) of Darcy is the bottom half of the integral apparatus, which includes not only the sedimentation chamber (26), but also the filtration chamber (72) [Figure 2; paragraphs 0035-0037]. In the absence of the lid (22), the base (32) clearly is not intended for shipping or storage separated from the dome lid (22). Further, in Figure 2, the 'inlet port' (16) is part of the dome lid (22), not part of the base (32).

While the removable plastic sleeve-insert (14) of Darcy can be used to 'readily dump' the collected contents into a container, Darcy lacks any teaching that would suggest that the removable plastic sleeve-insert should or could serve as a 'collection container' according to Applicants' invention, which can be detachably connected to the air-water separation tank and can provide for secure shipping and storage.

Moreover, Darcy's base (32) lacks inlet and outlet ports. In Figure 2, the 'inlet port' (16) is part of the dome lid (22), not part of the base (32). While the rejection suggests that items (48) and (56) constitute such ports, this is inconsistent with Darcy's teaching, at paragraph [0037], that items 36, 38, 40, 42, 44, 46, and 48 are 'arrows' representing the direction in which liquid and particulate matter flow from the separation chamber (34) towards the sedimentation zone (26); and items 52, 54, 56 and 58 are 'arrows' representing the direction through which waste water flows from the sedimentation chamber (26) into the filtration chamber (28). Rather than representing inlet and outlet ports of different heights, items (48) and (56) are not ports of different physical heights. Rather they are direction arrows indicating flow of the waste water through the apparatus.

Thus, it is inaccurate to assert that Darcy teaches or suggests the presence of an 'inlet and outlet ports' as part of the collection container, or that the inlet port should be taller or shorter in dimension than the outlet port. Additionally, new claims 13 and 14 recite that the air-water separator tank comprises a mating surface, and the collection container comprises a top mating surface, as well as inlet and outlet ports. Finally, new claims 13 and 14 recite that the collection container comprises one or more keyways cast into its top mating surface, and the air-water

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separator tank comprises one or more corresponding keys cast into its mating surface, such that the keys and keyways must be aligned in order for the collection container and air-water separator tank to mate securely. Such mating surfaces, inlet and outlet ports, and corresponding keys and keyways are present in Darcy. Erickson does not remedy any of the above deficiencies of Darcy. Neither does Erickson teach or suggest modifying Darcy in a manner that would overcome such deficiencies. Accordingly, Applicants' dental amalgam separation system of new claims 13 and 14 are not rendered obvious by the combination of Darcy and Erickson.

Allowable Subject Matter

It is gratefully acknowledged that the Examiner has previously stated that claims 11 and 12 would be allowable if rewritten to overcome the rejections under 35 U.S.C. §112(b), second paragraph, set forth in the Office Action, and to include all of the limitations of the base claim and any intervening claims. With the cancelation of claims 1 to 12, the presentation of new claims 13 and 14 amendment is believed to overcome all of the outstanding grounds of rejection. Thus, it is submitted that new claims 13 and 14 are in condition for allowance.

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CONCLUSION

Applicants submit that the amendment and other papers filed herewith, together with the specification and drawings previously submitted on January 28, 2019, fully respond to the objections and grounds of rejection stated in the Office Action mailed on July 26,2018. For the reasons described herein, Applicants submit that those rejections have been overcome by the arguments and evidence submitted herewith and should not be applied to new claims 13 and 14. Accordingly, it is submitted that claims 13 and 14 should be found allowable, and the case should be passed to issue.

Applicants hereby claim small entity status under 37 CFR §1.27. If any additional fees are due, the Examiner is requested to contact Applicants' undersigned representative.

Applicants' undersigned representative may be reached by telephone at 617-966-2374. All correspondence should continue to be directed to the listed address.

Respectfully submitted,

/Steven R. Lazar/

Steven R. Lazar
Attorney for Applicants
Registration No. 32,618

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234 Broadway
Arlington, MA 02474
October 15, 2019

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US	9884

80709 7590 05/14/2019

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

EXAMINER	
LUCCHESI, NICHOLAS D	

ART UNIT	PAPER NUMBER
3772	

NOTIFICATION DATE	DELIVERY MODE
05/14/2019	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):

srlpatents@aol.com

Notice of Non-Compliant Amendment (37 CFR 1.121)	Application No. 15/730,828	Applicant(s) Mozzicato et al.	
	Examiner NICHOLAS D LUCCHESI	Art Unit 3772	AIA (FITF) Status Yes

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

The amendment document filed on 01/28/2019 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
  - ☐ A. Amended paragraph(s) do not include markings.
  - ☐ B. New paragraph(s) should not be underlined.
  - ☐ C. Other _____ .
- ☐ 2. Abstract:
  - ☐ A.Not presented on a separate sheet. 37 CFR 1.72.
  - ☐ B.Other _____ .
- ☐ 3. Amendments to the drawings:
  - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet", "New Sheet", or " Annotated Sheet" as required by 37 CFR 1.121(d).
  - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
  - ☐ C. Other _____ .
- ☑ 4. Amendments to the claims:
  - ☐ A. A complete listing of all of the claims is not present.
  - ☑ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
  - ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
  - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
  - ☑ E. Other: See Continuation Sheet .
- ☐ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4):

_____

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period if the non-compliant amendment is an** after-final amendment or an amendment filed after allowance. If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.

2. Applicant is given **two months** from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a *Quayle* action. If any of above boxes 1. to 4. are checked, the correction required is only the **corrected section** of the non-compliant amendment in compliance with 37 CFR 1.121.

   Extensions of time are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

   Failure to timely respond to this notice will result in:
   Abandonment of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or
   Non-entry of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

/NICHOLAS D LUCCHESI/
Primary Examiner, Art Unit 3772

Continuation of 4(e) Other: Claim 6 does not include all of the canceled language from previously filed claim 6. Claim 7, lines 2 and 3 appear to be missing a bracket, thus it is unclear as to which language is intended to be canceled.

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CLAIMS:

Please amend the claims as follows:

1. (Presently Amended) A dental amalgam **separation** [recycling] system **for removing and collecting** [recycling] particles from a dental liquid effluent drawn **by means of a vacuum** [from a suctioning device] comprising:

(a) an air-water separator tank for receiving said effluent, said air-water separator tank **comprising a mating surface, and further comprising** [having] an air-water separator tank inlet in fluid communication with said **vacuum** [suctioning device]; an air-water separator tank liquid effluent outlet; and an air-water separator tank air outlet;

(b) a detachable **collection** [recycling] container, said **collection** [recycling] container acting primarily under the influence of gravity to cause **sedimentation** [settlement] of said particles; said **collection** [recycling] container **comprising a top mating surface, said top mating surface** having a **collection** [recycling] container effluent inlet port **detachably** connected to said air-water separator tank liquid effluent outlet; and said **collection** [recycling] container further having an effluent outlet port;

(c) wherein the air-water separator tank also includes [an internal] **a** suction conduit;

[(d) wherein the recycling container comprises threads;]

(d) [(e)] wherein the **collection** [recycling] container effluent inlet port and the **collection** [recycling] container outlet port are not the same height.

2. (Presently Amended) The dental amalgam **separation** [recycling] system of claim 1, **wherein the collection container comprises threads; and** further comprising: [(f)] **(e)** a [threaded] shipping cap**, wherein the shipping cap comprises a mating surface,** [for] **such that**

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the shipping cap can be connected securely with the collection container by placing the shipping cap over the top mating surface of said **collection** [recycling] container**.** [;and]

3. (Presently Amended) The dental amalgam **separation** [recycling] system according to claim 1, further comprising a first plug for said **collection** [recycling] container inlet port and a second plug for said **collection** [recycling] container effluent outlet port.

4. (Presently amended) [A] **The** dental amalgam **separation** [recycling] system according to claim [3,] **2, further comprising a first plug for said collection container inlet port and a second plug for said collection container effluent outlet port**, wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

5. (Presently amended) [A] **The** dental amalgam **separation** [recycling] system according to claim 4, further comprising an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

6. (Presently Amended) A dental amalgam **collection** [recycling container] **kit** comprising **a dental amalgam collection container having a top mating surface, wherein said top mating surface comprises an effluent inlet port and an effluent outlet port of unequal height on the top surface, said dental amalgam collection kit further comprising a shipping cap, wherein the shipping cap comprises a mating surface, such that the shipping cap can be connected securely with the collection container, by placing the shipping cap over the top mating surface of the collection container.**

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7. (Presently Amended) [A] **The** dental amalgam **collection** [recycling] container according to claim 6, further comprising [two plugs held in place by said shipping cap and an O-ring [fitted in an O-ring groove to prevent leaks]**, a first plug for said effluent inlet port and a second plug for said effluent outlet port, wherein said two plugs are held in place by said shipping cap when said shipping cap is placed over the top surface of the collection container**.

Claim 8 is canceled.

9. (Presently Amended) An adapter for **a detachable collection container, said adapter having a top mating surface with an effluent inlet port and an effluent outlet port of unequal heights,** [an air-water separator tank] wherein the adapter enables a [recycling] **collection** container without compatible effluent **inlet and outlet** ports to **mate securely with** [attach to] the air-water separator tank of the dental amalgam **separation** [recycling] system of claim 1 **by placing the adapter over the top mating surface of said collection container**.

10. (Presently Amended) [An] **The** adapter according to claim 9, wherein the **collection container lacks threads on the outside of its top mating surface; and the** adapter [is without] **comprises** threads **on the outside of its top mating surface**.

11. (Presently Amended) [A] **The** dental amalgam **separation** [recycling] system according to claim 1, wherein said **collection** [recycling] container further comprises one or more irregular keyways cast into [its] **the** outside **of its** top mating surface; and said air-water separation tank has one or more keys cast into its mating surface, such that the keys of the air-water separation tank and the keyways of said **collection** [recycling] container must be aligned in order for said **collection** [recycling] container and said air-water separation tank to mate securely.

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12. (Presently Amended) [A] **The** dental amalgam **separation** [recycling] system according to claim 2, wherein said **collection** [recycling] container further comprises one or more irregular keyways cast into [its] **the** outside **of its** top mating surface; and said threaded shipping cap has one or more keys cast into its mating surface, such that the keyways of said **collection** [recycling] container must be aligned in order for said **collection** [recycling] container and said shipping cap to mate securely.

13. (New) A dental amalgam separation system for removing and collecting particles from a dental liquid effluent drawn by means of a vacuum, comprising:

(a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said vacuum, an air-water separator tank liquid effluent outlet and an air-water separator tank air outlet;

(b) a detachable collection container, said collection container acting primarily under the influence of gravity to cause sedimentation of said particles, and having a collection container inlet port connected to said air-water separator tank liquid effluent outlet and said collection container also having an effluent outlet port;

(c) wherein the air-water separator tank further comprises a suction conduit;

(d) wherein the collection container comprises one or more irregular keyways cast into its outside top mating surface of said collection container; and

(e) said air-water separation tank has one or more keys cast into its mating surface, such that the keys of the air-water separation tank must be aligned with the keyways of said collection container in order for said collection container and said air-water separation tank to mate securely.

14 (New) The dental amalgam separation system according to claim 13, wherein suction conduit is contained within the air-water separator tank.

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15 (New) The dental amalgam separation system according to claim 13, wherein the collection container effluent inlet port and the collection container outlet port are not the same height.

16 (New) The dental amalgam collection container according to claim 6, comprising one or more irregular keyways cast into its outside top mating surface; wherein said keyways must be aligned with keys of an air-water separation tank in order for said collection container and said air-water separation tank to mate securely.

17 (New) The dental amalgam collection container of claim 16, further comprising a first plug for said collection container inlet port and a second plug for said collection container outlet port.

18 (New) The dental amalgam collection container of claim 17, further comprising threads on its outer surface for attachment of a threaded shipping cap.

19 (New) The dental amalgam collection container of claim 18, further comprising a threaded shipping cap for said collection container, wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

20 (New) The dental amalgam separation system according to claim 1, wherein the suction conduit is contained within the air-water separator tank.

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REMARKS

Applicants submit this response to the Office Action, which was mailed on July 26, 2018. A petition for a three-month extension of time to respond has been filed, along with the appropriate extension fee, in the amount of $700.00. Applicants hereby claim small entity status under 37 CFR §1.27.

The claims are 1 through 7 and 9 through 20. Claim 8 has been canceled. Claims 1 through 7, and 9 through 12, have been amended to more distinctly claim the invention. Claims 13 to 20 are new.

In order to conform the claims, and to more distinctly claim the invention, Applicants have replaced certain claim terms as follows:

The term 'recycling system' has been replaced by the term 'separation system.' Support for the term 'separation system' is found throughout the specification, including paragraphs 0011; 0017; 0032; 0045 and 0088-0089.

The term 'recycling container' has been replaced by the term 'collection container.' Support for the term 'collection container is found throughout the specification, including paragraphs 0016-0018; 0032 and 0093.

The term 'recycling particles' has been replaced by the term 'removing and collecting particles.' Support for the term 'removing and collecting particles' is found throughout the specification, including paragraphs 0008-011; and 0082-0083.

The term 'suctioning device' has been replaced by the term 'vacuum.' Support for the term 'vacuum' is found throughout the specification, including paragraphs 0011; 0027; 0048; 0083; 0088-0093 and 0100.

The term 'settlement of said particles' has been replaced by the term 'sedimentation of said particles.' Support for the term 'sedimentation of said particles' is found throughout the specification, including paragraphs 0084-0089; 0094; and 0098-0099.

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The term 'detachably' has been added to modify 'connected.' Support for the term 'detachably connected' is found throughout the specification, including paragraphs 0022; 0052; 0062; 0064; 0066; 0068; 0070; 0072; 0074; 0076; 0078; 0080; 0085; 0089; and 0092-0093.

Claims 13 to 20 have been added to recite additional embodiments of the present invention.

Support for claims 13 to 20 is found in the specification and original claims, as illustrated in the chart below:

CLAIM	SUPPORT
13	Original claims 1-2, 11 and 12; paragraph 0031; Figures 1-2; Figures 6-15
14	Original claim 1; paragraph 0026
15	Original claim 1; paragraph 0024; Figures 4; Figure 10a; Figure 11a; Figure 12a; Figure 13a; Figure 14a and Figure 15a
16	Original claims 1-2, 6, 11 and 12; paragraph 0031; Figures 1-2; Figures 6-15
17	Original claims 3, 4 and 7; paragraphs 0027, 0029, and 0059; Figure 4
18	Original claims 1, 4,6; paragraphs 0025, 0029-0031; Figures 4; Figure 10a; Figure 11a; Figure 12a; Figure 13a; Figure 14a and Figure 15a
19	Original claims 2, 4, 12; paragraph 0025, 0027, 0031; Figure 4a and 4b;
20	Original claim 1; paragraph 0026

No new matter has been added.

Claim Rejections Under 35 U.S.C. §112

Several of the claims have been rejected under 35 U.S.C. §112, for various objections that are stated to render the claims indefinite. The Examiner is thanked for his careful examination. These rejections are addressed as follows.

Claim 1 is rejected in its recitation that the suctioning device is in fluid communication with the tank inlet, while the suctioning device is only functionally recited, rendering claim 1 unclear as to whether it is being positively claimed. Applicants have amended claim 1 to note that the dental liquid effluent is drawn by means of a vacuum. It is clearly stated at paragraph [0048] that the Outlet Tube [8] of the invention leads to a vacuum system, but that the vacuum system is not itself a necessary element of the invention. At paragraph [0083] of the specification, it is further stated that the dental amalgam separation system of the present invention can be installed in

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an office using a pre-existing suction/vacuum pump system, and can share a common vacuum pump with conventional dental chair suction apparatus. Hence, the suction/vacuum system is not a required element of the present system. Accordingly, this ground of rejection has been obviated by the amendments.

Claim 2, line 2 is rejected as incomplete. This error has been corrected by the amendment of claim 2.

Claims 4 and 5, line 2, 'said shipping cap' is stated to lack prior antecedent basis. To correct this error, claim 4 has been amended to depend from claim 2.

Claim 7, line 2, 'said shipping cap' is stated to be unclear in that the shipping cap is recited to hold the two plugs in place; and it is therefore unclear whether the shipping cap is being positively claimed. In amended claim 7, it is clear that the 'shipping cap' depends from claim 6, which positively recites a shipping cap. Thus, this ground of rejection has been obviated.

Claims 11 and 12 are stated to be unclear in reciting "its outside top mating surface" and "its mating surface" have no antecedent basis. Applicants have amended claim 1 to recite that the collection container comprises a top mating surface, and the air-water separator tank comprises a mating surface. Applicants have also amended claim 2 to recite that the shipping cap comprises a mating surface. Thus, these grounds of rejection have been obviated.

Claim 9 is rejected under 35 U.S.C. §112(d) as failing to further limit the subject matter of the claim upon which it depends. Applicants have canceled claim, and have amended claim 9 to depend from claim 1, and to recite the inclusion of a further component, that is, an adapter that can be used with a collection container that does not comprise inlet and outlet ports that are compatible with the dental amalgam separation system of claim 1. Thus, this ground of rejection has been obviated.

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Claim Rejections Under 35 U.S.C. §102

Erickson:

Claim 6 is rejected under 35 U.S.C. §102(a)(1) as being anticipated by Erickson US 6,592,769. It is asserted that Erickson teaches a dental amalgam recycling container, comprising threads for attachment of a shipping cap.

Applicants have amended claim 6 to recite a dental amalgam collection kit that comprises a collection container and a shipping cap. The collection container has a top mating surface that comprises **an effluent inlet port, and effluent outlet port of unequal height.** Support for this amendment is found in Figure 1, as well as throughout the specification. In paragraphs [0068-0069] it is described that the detachable collection container of Figure 1 (12) comprises an inlet port (15) and an outlet port (16). In paragraph [0072] it is described that the "ports (16) and (15) may be different heights in order to aid in alignment of the detachable recycling container (12) in the air-water separator base (7)."

The device of Erickson does not disclose such a dental amalgam collection kit. Figures 1, 2, 3 and 4 of Erickson clearly describe that the inlet and outlet conduits (6) and (6a) each protrude horizontally from the side of the environmental filter manifold (5) at the same height and distance from the filter, above and **not** part of the removable collection chamber (13). Inlet and outlet conduits (6) and (6a) connect the manifold (5) with incoming air (18) and outgoing air, and do not align or connect with the detachable, removable collection chamber (13). Thus, as amended, the dental amalgam collection kit of claim 6 is neither anticipated nor rendered obvious by Erickson.

Hubner:

Claims 9 and 10 are rejected under 35 U.S.C. §102(a)(1) as being anticipated by Hubner et al. '052. It is asserted that Hubner discloses a separator system, which includes an adaptor [90, 100] that enables a recycling container [52] to be connected to a separator tank. It is asserted that,

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due to the different sizes of the diameters of the adaptors [90, 100], such adaptors of Hubner could be used to attach any separator tank to any recycling container and that claim 9 only requires that the adaptor "enables" a recycling tank to be capable of being connected to the separator tank of claim 1 (i.e., the separator tank of claim 1 is only functionally recited in claim 9).

This ground of rejection is traversed for the following reasons. As amended, claim 9 recites an adapter for a detachable collection container, said adapter having a top mating surface with an effluent inlet port and an effluent outlet port of unequal heights, wherein the adapter enables a collection container without compatible effluent inlet and outlet ports to mate securely with the air-water separator tank of the dental amalgam separation system of claim 1. Such an adapter is illustrated in Figure 3b. The adapter has a top mating surface with effluent inlet and outlet ports of unequal heights, such that, by placing the adapter over the top mating surface of the incompatible collection container, the collection container is now able to mate securely to the air-water separator tank of the dental amalgam separation system of claim1.

Hubner does not teach or suggest this feature of the adapter of claim 9 as amended. As illustrated in Figure 3 of Hubner and as stated by the Examiner, the adaptors [90, 100] of Hubner merely enables the attachment of a separator tank to a recycling container by adapting the diameters of the ports. There is no disclosure in Hubner that teaches or suggests an adaptor comprising a top mating surface with effluent inlet and outlet ports of unequal heights, as in the present invention, to enable secure mating with the separator tank such as used in the present

Accordingly, Hubner does not anticipate the adapter of claims 9 and 10, and this ground of rejection should be withdrawn..

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Claim Rejections Under 35 U.S.C. §103

Erickson:

Claims 7 and 8 is rejected under 35 U.S.C. §103 as being unpatentable over Erickson (US 6,592,769). It is asserted that Erickson discloses a stop [15] (column 6, line 23-24) and an O-ring [2] (column 5, line 58). It is admitted that Erickson does not specify two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks. However, it is asserted that it would have been obvious for one of ordinary skill in the art to utilize plugs (stops) held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks, in order to provide a better seal for the container to prevent leaking of the cap during the shipping process. It is asserted that Erickson contemplates the use of a plug (stop) and O-ring for sealing purposes.

The above grounds of rejection are traversed for the following reasons. Applicants respectfully point out that Erickson does not mention either a "plug" or an "O-ring." The Examiner apparently construes that the "stops" (15) and (15a) teach or suggest Applicant's use of "plugs," and that the "plastic washer" (2) teaches or suggests Applicant's use of an "O-ring." However, this rejection overlooks significant differences in the structures and functions of these elements --- the "stops" and "plastic washer" of Erickson --- compared to the "plugs" and "O-ring" that are recited in Applicant's claimed invention.

The "plugs" of Applicants' claimed device physically occupy and 'plug' the holes of the inlet and outlet ports of Applicants' recited collection container. Because of their structure and function, Applicants' "plugs" are firmly held in place by fitting a shipping cap over the inlet and outlet ports. In this manner, the "plugs" help to minimize any leakage from the collection container during storage or shipping.

In contrast, Figures 3 and 4 of Erickson illustrate the structure and function of the "stops" (15) and (15a) of the Erickson device. "Stops" (15) and (15a) are nodules or bumps that project from the inside surface of the manifold (5), and control rotation of the internal adjustable conduit

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(11b) located in the baffle plate (12a). Thus, the 'stops' do not physically occupy or 'plug' the apertures of inlet and outlet ports. Rather, the "stops" limit the ability to rotate the baffle plate (12a), such that it can be rotated no more than 90°, in order to switch the operation between 'collect mode' and 'pass-through mode.' [See Column 6, lines 25 through 39].

The above differences in structure and function between Applicants' "plugs" and the "stops" of Erickson are significant and are central to the function of Applicants' claimed invention. There is no teaching or disclosure in Erickson that would suggest that a shipping or storage cap can be tightly fit over the assembly that includes the inlet and outlet ports, appropriately plugged for shipping. Rather, Figure 2 of Erickson includes a "lid" (14) which covers only the "collection chamber" (13). The collection chamber (13) of Erickson lacks any inlet or outlet ports. The user would have no ability to fit a shipping cap over the manifold (5) and the "stops" (15) and (15a) of the device of Erickson. In contrast, Applicants' shipping cap is adapted so as to fit over the collection container, including the inlet and outlet ports, in a manner that tightly fits over the plugs as a means for preventing leakage during storage or shipping.

Similarly, the "O-ring" of the claimed invention differs substantially in structure and function from the "plastic washer" (2) of Erickson. In the present invention, the O-ring is taught to 'provide an air and effluent tight seal when said shipping cap is fitted in place' on the claimed collection container [paragraph 0028]. In contrast, it is clearly taught in Erickson that the washers, including the "plastic washer (2)" are intended to keep separate two surfaces. The "plastic washer (2)" is specifically taught to be located between the screw (1) and the control handle (3) of Figures 1 and 2. Erickson teaches that the purpose of these washers is 'for turning convenience and to reduce friction when turning the control handle 3." [Erickson, column 5, line 55 to column 6, line 9]. Thus, the washers do not contribute to an air and effluent tight seal, as does the O-ring in Applicants' invention. Thus, Erickson clearly does not teach or suggest the inclusion of 'plugs' or 'an O-ring' as in the present invention as recited in claim 7. Because the stops (15) and (15a) and

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plastic washer (2) of Erickson are not intended or required to provide an air and effluent tight seal, Erickson does not provide teaching or motivation for modification of the devices taught therein to add the recited elements of the present invention, and would not have rendered obvious the invention of claim 7.

Claim 8 is dependent upon claim 7, and is therefore novel and unobvious over Erickson for at least the same reasons. Claim 8 is further novel and inventive over Erickson in that it recites the presence of a 'two tier cap,' which is not present in Erickson.

Darcy and Erickson:

Claims 1-5 are rejected 35 U.S.C. §103 as being unpatentable over Darcy (US 2010/0264074), in view of Erickson. With regard to claim 1, it is asserted that Darcy discloses a dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device (paragraph 19), comprising various elements of Applicants' invention:

(a) an air-water separator tank for receiving the effluent (paragraph 32), said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device, an air-water separator tank liquid effluent outlet (paragraphs 31 and 37) and an air-water separator tank air outlet [20];

(b) a detachable recycling container [26], said recycling container acting primarily under the influence of gravity to cause settlement of said particles (paragraph 41); said recycling container having a recycling container effluent inlet port [48] connected to said air-water separator tank liquid effluent outlet [46]; and said recycling container further having an effluent outlet port [20];

(c) wherein the air-water separator tank also includes an internal suction conduit [60];

(d) wherein the recycling container comprises a mechanical connection [23] (paragraph 33)

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(e) wherein the recycling container [26], effluent inlet port [48], and the recycling container outlet port [56] are not of the height [Figure 1, which is asserted to show [48] and [56] at different heights].

Darcy is admitted not to disclose where the recycling container comprises threads. Erickson is asserted to disclose wherein the recycling container comprises threads [17] (column 6). It is asserted that it would have been obvious to one of ordinary skill in the art to modify to provide threads on the collection tank of Darcy, as taught by Erickson, if one wished to provide for easy separation and removal of the collection tank.

With respect to claim 2, Darcy/Erickson are asserted to disclose the dental amalgam recycling system according to claim 1, with Erickson further asserted to disclose a threaded shipping cap for said recycling container (Figure 2, and column 7).

With respect to claim 3, Darcy/Erickson are asserted to disclose the dental amalgam recycling system according to claim 1, with Erickson further asserted to disclose a lid [14] (column 7, lines 11-13) and a plug (stop). It is admitted that Darcy/Erickson do not specify further comprising a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port. However, it is asserted that it would have been obvious to one of ordinary skill in the art to use a plug to close both the inlet port and outlet port to provide additional seal to the recycling container of Darcy/Erickson.

With respect to claim 4, Darcy/Erickson are asserted to disclose the dental amalgam recycling system according to claim 3. It is admitted that Darcy/Erickson do not specify wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place. However, it is asserted that it would have been obvious to one of ordinary skill to use the threaded shipping lid to hold the first and second plugs in place in order to provide an additional seal in order to ensure that potentially hazardous material is not released.

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With respect to claim 5, Darcy/Erickson are asserted to disclose the dental amalgam recycling system according to claim 4. It is asserted that Darcy further discloses an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place [paragraph 33].

The above grounds of rejection are traversed for the following reasons. As amended, claim 1 recites a dental amalgam separation system that includes 'a detachable collection container.' Darcy does not disclose a 'detachable collection container.' Rather, Darcy contains a "removable plastic inner basket 14" or inner sleeve, from which "the contents of the inner sleeve can then be readily dumped into container." [Darcy paragraph 0027].

The rejection apparently considers that the sedimentation chamber (26) of Darcy constitutes a detachable collection container. This is incorrect. As described at paragraphs 35 through 37 of Darcy, the sedimentation chamber (26) is one segment of the base (32) which also includes the filtration chamber (28). The entire base (32) can be detached from the lid (22), but the sedimentation chamber (26), where waste is collected, cannot be separately detached. As clearly seen in Figure 2, when the lid (22) is detached from the base (32), it leaves the entire bottom half of the integral apparatus. There is no teaching or suggestion in Darcy that the base (32) is used for shipping or storage separated from the dome lid (22). In fact, Darcy teaches the use of a removable plastic sleeve-insert (14) to 'readily dump' the collected contents into a container. This sleeve (14) would be superfluous if either the sedimentation chamber (26) or base (32) were intended or suitable for collection and disposal of the contents of the removable sleeve.

Moreover, Darcy's base (32) lacks inlet and outlet ports. In Figure 2, the 'inlet port' (16) is part of the dome lid (22), not part of the base (32). While the rejection suggests that items (48) and (56) constitute such ports, this is inconsistent with Darcy's teaching, at paragraph [0037], that items 36, 38, 40, 42, 44, 46, and 48 are 'arrows' representing the direction in which liquid and particulate matter flow from the separation chamber (34) towards the sedimentation zone (26); and items 52, 54, 56 and 58 are 'arrows' representing the direction through which waste water flows

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from the sedimentation chamber (26) into the filtration chamber (28). Rather than representing inlet and outlet ports of different heights, items (48) and (56) are not ports of different physical heights. Rather they are direction arrows indicating flow of the waste water through the apparatus. Thus, it is inaccurate to assert that Darcy teaches or suggests the presence of an 'inlet and outlet ports' as part of the collection container, or that the inlet port should be taller or shorter in dimension than the outlet port. Finally, as amended, claim 1 recites that the air-water separator tank comprises a mating surface, and the collection container comprises a top mating surface as well as inlet and outlet ports. Such mating surfaces, and inlet and outlet ports, are not present in Darcy.

Erickson does not remedy any of the above deficiencies of Darcy. Neither does Erickson teach or suggest modifying Darcy in a manner that would overcome such deficiencies. Accordingly, Applicants' dental amalgam separation system of claim 1 is not rendered obvious by the combination of Darcy and Erickson.

Claims 2 through 5 are dependent upon claim 1, and are therefore patentably non-obvious over Darcy and Erickson for at least the reasons discussed above. Additionally, claim 2 recites a shipping cap for the detachable collection container. Neither Darcy nor Erickson teaches or suggests a shipping cap for Applicant's collection container which contains inlet and outlet ports. The lid (14) disclosed in Erickson cannot accommodate either the large base (32) or the removable plastic sleeve-insert 14 of Darcy, and does not suggest that a cap should be placed over a detachable collection container with inlet and outlet ports. Rather Erickson merely discloses that a threaded lid (14) can be used to cover a collection chamber (13), which is a separate container that lacks inlet or outlet ports [Erickson, Figure 2].

Claim 3 recites the presence of first and second plugs for the inlet port and outlet port of the detachable collection container. As discussed in detail above, Erickson neither discloses nor

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suggests the use of 'plugs,' nor does it supply motivation for modifying the apparatus disclosed therein to provide such plugs.

Claim 4 additionally recites that the first and second plugs are held tightly in place by fitting the threaded shipping cap onto the detachable collection container. There is no disclosure in Darcy or Erickson that would teach or suggest the use of such a shipping cap in relation to the use of 'plugs' or an inlet and outlet port.

Claim 5 additionally recites an O-ring that provides an air and effluent tight seal when the shipping cap is fitted in place over the detachable collection container, which contains inlet and outlet ports. As discussed in detail above, Erickson neither teaches nor suggests the use of an O-ring. Darcy discloses the use of an O-ring to connect the lid 22, sedimentation chamber 26 and filtration chamber 28 to the body 30; i.e., to connect the two halves of the integral apparatus. However, the O-ring is not disclosed for use in conjunction with a shipping cap [Darcy, Figure 2].

Allowable Subject Matter

It is gratefully acknowledged that the Examiner has stated that claims 11 and 12 would be allowable if rewritten to overcome the rejections under 35 U.S.C. §112(b), second paragraph, set forth in the Office Action, and to include all of the limitations of the base claim and any intervening claims.

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CONCLUSION:

Applicants submit that the amendment and other papers filed herewith fully respond to the Office Action mailed on July 26,2018. For the reasons described herein, Applicants submit that the rejections stated in set Office Action are overcome by the arguments and evidence submitted herewith, that the amendment should be entered and the claims found allowable.

Applicants hereby claim small entity status under 37 CFR §1.27. If any additional fees are due, the Examiner is requested to contact Applicants' undersigned representative.

Applicants' undersigned representative may be reached by telephone at 617-966-2374. All correspondence should continue to be directed to the listed address.

Respectfully submitted,

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DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

RELATED APPLICATIONS

[001] This patent application claims priority from provisional patent application serial number 62/414,712, filed on October 29, 2016; and provisional patent application serial number 62/406,990, filed on October 12, 2016. This application further claims priority from patent application serial number 29/667,212, filed October 19, 2018, which is a continuation of serial number 29/585,659, filed on November 28, 2016, now patent number D835,778. This patent application further claims priority from patent application serial number 29/585,674, filed on November 28, 2016. This patent application further claims priority from patent application serial number 29/672,887, filed on December 10, 2018, which is a continuation of patent application serial number 29/585,668, filed on November 28, 2016, now patent number D835,779. This patent application further claims priority from patent application serial number 29/577,701, filed on September 14, 2016. This patent application further claims priority from patent application serial number 29/567,544, filed on June 9, 2016. This patent application further claims priority from patent application serial number 29/671,943, filed on November 30, 2018, which is a continuation of patent application serial number 29/555,622, filed on May 23, 2016, now issued patent D835,264.

FIELD OF THE INVENTION

[002] This invention relates to systems and apparatus suitable to remove particles from effluent waste, and particularly, to remove amalgam and other metallic particles and other abrasive solids from dental office suction effluent. The system also comprises a self contained recycling container to facilitate customer regulatory compliance and environmental safeguards.

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BACKGROUND OF THE INVENTION

[003] Dental amalgam is a dental filling material used to fill cavities caused by tooth decay. It has been used for more than 150 years in hundreds of millions of patients around the world.

[004] Dental amalgam is a mixture of metals, consisting of liquid (elemental) mercury and a powdered alloy composed of silver, tin, and copper. Approximately 50% of dental amalgam is elemental mercury by weight. The chemical properties of elemental mercury allow it to react with and bind together the silver/copper/tin alloy particles to form an amalgam. See http://www.fda.gov/MedicalDevices/ProductsandMedical Procedures/DentalProducts/ DentalAmalgam/ucm171094.htm, accessed September 9, 2016.

[005] Amalgam is used less often than in the past, mostly because tooth-colored materials now can be used. However, the newer materials can't be used for all dental situations, amalgam is less costly than newer materials and it lasts longer, especially in teeth that undergo a lot of pressure and wear from chewing.

[006] Better dental health overall coupled with increased demand for more modern alternatives such as resin composite fillings (which match the tooth color), as well as public concern about the mercury content of dental amalgam, have resulted in a steady decline in dental amalgam use in developed countries, though overall amalgam use continues to rise worldwide. Stein, PS; Sullivan, J; Haubenreich, JE; Osborne, PB (2005). "Composite resin in medicine and dentistry". Journal of long-term effects of medical implants. 15 (6): 641–54. doi:10.1615/jlongtermeffmedimplants. v15.i6.70. PMID 16393132.

[007] Although amalgams are less frequently used in developed countries for new dental fillings than in the past, amalgams continue to make up a portion of the particle component of dental office effluent mainly because of the fact that old fillings made of amalgams are drilled out and removed in the effluent waste when new fillings are effected to replace the old. Further, as noted above, even under current dental practice, an amalgam is preferred for some tooth filling situations.

[008] Because mercury is a poison that can accumulate in living tissues and can pose a health hazard to species in a food chain exposed to mercury-containing compounds, and since humans are inevitably at the end of the food chain, it follows that effluent containing

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amalgams can pose a health hazard to the community at large. Also, certain metals such as silver are commercially valuable if recovered in quantity. For those reasons, it is desirable to devise systems, apparatus and processes for removing amalgams from dental office effluent and efficiently recycling those amalgams.

[009] In addition to removing amalgams, other matter disposed into dental office suction effluent includes aluminum oxides used in air abrasion treatments and other solid waste material. These solid materials tend to wear out or damage vacuum pumps and other equipment downstream of the dental chair suction apparatus, and also constitute effluent water contaminants. Therefore, it is desirable for the apparatus to remove solid abrasive material and other particulate waste from the dental office suction effluent.

[0010] The World Health Organization also points out that amalgam separators, installed in the waste water lines of many dental offices, dramatically decrease the release of mercury into the public sewer system. However, critics say that the separators are still not mandatory in some states of the United States. "Purchasing, installing and operating dental amalgam separators: Practical issues". The Journal of the American Dental Association. 134 (8): 1054–65. doi:10.14219/jada.archive.2003.0319. PMID 12956345. Recently, the EPA has enacted nation-wide regulations requiring amalgam separators in dental offices.

[0011] Previously known apparatus for removing amalgam particles from dental office suction effluent are known to include a collecting tank for collecting a day's accumulation of suction effluent from one or more sources of such waste. The waste is sucked from the dental chair suction apparatus and into the collecting tank by a vacuum pump. When the vacuum pump is turned off, an outlet valve is opened and the accumulated waste is deposited into a separation device intended to separate metal particles from the effluent liquid. Flow into the separation device is induced by the head of fluid in the collecting tank. Particles passing through the separation device are separated from the waste by gravity and settle to the bottom of the separation device. The flow rate is dependent on the head inside the collecting tank; as the head diminishes, the flow rate also diminishes. The changes in flow rate are undesirable because the particle separation rate is affected, and the system becomes prone to plugging when the flow rate decreases. Also, since the waste can be deposited only when

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the vacuum pump is off, waste is usually moved to the separation device at the end of the day. As a result, the collecting tank and separation device tend to be undesirably large and the whole process is time consuming.

[0012] Another known apparatus is a centrifuge type system that separates heavier metal particles from effluent liquid by collecting the particles at the peripheral wall of the centrifuge. This apparatus does not effectively separate lighter particles, and is expensive to purchase and operate due to the complexity of its mechanical parts.

[0013] Yet another known apparatus uses a dedicated mechanical pump to suction waste liquids through a separator device. Again, a dedicated pump can be expensive to purchase and to maintain, and can be undesirably space-consuming.

[0014] Such known systems can become quite complex, unwieldy and expensive, as for example that disclosed in U.S. Pat. No. 5,885,076 granted 23 Mar. 1999. It teaches the use of sedimentation, co-precipitation and filtration in an expensive complicated apparatus that is probably economical, if at all, only for relatively large installations such as a military base dental complex.

[0015] U.S. Pat. No. 6,692,636 and U.S. Pat. No. 6,596,754 are patents that disclose systems for removing amalgam from dental office suction effluent.

[0016] After collecting the amalgam and other solid waste the dentist is left with the problem of what to do with the waste. Either the dentist has to deal with his own hazardous waste or he can send his collected material to a recycler. In either case, the "collection container" needs to be disposable and easily replaceable.

[0017] Existing recycling programs generally require the provision of bulky shipping materials and the delivery of those materials to the dentist for every full container. If such materials are not provided and the materials are not properly recycled a large part of the benefit of collecting the amalgam waste can be lost. It is important that the waste is recycled under federal guidelines in order to make sure the full benefits of amalgam separation are achieved.

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[0018] Additionally, containers for collection, such as dental amalgam recycling systems, can be compromised by incorrect installation or misalignment, which can cause O-rings to deform and/or seal irregularly, and result in leakage.

SUMMARY OF THE INVENTION

[0019] The present invention overcomes many of the shortcomings of the prior technology and achieves further advantages that will be apparent after reviewing the following detailed description.

[0020] In one aspect, the invention comprises a dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device. In certain embodiments, the dental amalgam recycling system of the invention comprises:

[0021] (a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device, an air-water separator tank liquid effluent outlet and an air-water separator tank air outlet;

[0022] (b) a detachable recycling container, said recycling container acting primarily under the influence of gravity to cause settlement of said particles; said recycling container having a recycling container effluent inlet port connected to said air-water separator tank liquid effluent outlet and said recycling container further having an effluent outlet port;

[0023] (c) wherein the air-water separator tank also includes an internal suction conduit;

[0024] (d) wherein the recycling container comprises threads;

[0025] (e) wherein the recycling container effluent inlet port and the recycling container outlet port are not the same height.

[0026] In certain embodiments, the dental amalgam recycling system further comprises (f) a threaded shipping cap, wherein the threads of the shipping cap and the threads of the recycling container are complementary such that, when the shipping cap is fitted in place, the shipping cap forms a tight seal with said recycling container.

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[0027] While in use, the dental amalgam recycling system is functionally associated with a vacuum pump having a vacuum pump inlet. The vacuum pump is typically a pre-existing part of the dental office facility. In particular embodiments, the dental amalgam recycling system is physically connected with a vacuum pump via a suction conduit in the air-water separator. In certain preferred embodiments, the suction conduit is an internal suction conduit within the air-water separator.

[0028] In certain embodiments, the dental amalgam recycling system of the invention further comprise a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port. Said first and second plugs may be held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

[0029] In certain embodiments, the dental amalgam recycling system of the invention further comprise an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

[0030] In certain embodiments, the invention comprises a container, useful as a dental amalgam recycling container, comprising threads for attachment of a shipping cap. In certain embodiments, the dental amalgam recycling container further comprises two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks. The dental amalgam recycling containers of the present invention may further comprise a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal.

[0031] In certain embodiments, the invention comprises an adapter for an air-water separator tank, wherein the adapter enables a recycling container without compatible effluent ports to attach to an air-water separator tank. Said air-water separator tank may comprise, for example, a component of a dental amalgam recycling system, as described above. In certain embodiments, the adapter may comprise threads. In alternative embodiments, the adaptor may be without threads.

[0032] As described above, the potential for leakage exists in a collection canister such as a recycling container used in the dental amalgam recycling systems described herein. Such leakage may occur, for example, due to incorrect installation, or due to misalignment of a

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container and its intended mating partner, such as the air-water separation tank or its intended cap, such as a threaded shipping cap, which may cause O-rings to deform and/or seal irregularly. In order to address this problem and/or reduce the potential for leakage, a collection canister, such as a recycling container used in a dental amalgam recycling system, may have one or more irregular 'keyways' cast into its outside top mating surface, and the intended mating partner, such as the air-water separation tank, or the shipping cap, may have one or more corresponding 'key(s)' be cast into its mating surface, such that the key(s) and keyway(s) must be aligned in order for the collection canister (e.g., the recycling container) and its mating partner (e.g., the air-water separation tank; or the shipping cap) to mate properly. This key/keyway system can help ensure even pressure across the entire circumference of the O-ring surface on each port. Similarly, such key(s) and keyway(s) may be used to ensure proper replacement of the container and/or the air-water separation tank, such that incorrect replacement can be avoided or minimized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] FIG. 1 is a schematic front view of an embodiment of particle removal and recycling apparatus according to the invention, for particular use in a dental office.

[0034] FIG. 2 is a schematic side view of an embodiment of particle removal and recycling apparatus according to the invention, for particular use in a dental office.

[0035] FIG. 3 a is a schematic view of an embodiment of a universal adapter for fitting various different sized recycling containers to the air-water separator of the present invention.

[0036] FIG. 3 b is a schematic view of an alternative embodiment of a universal adapter for fitting various different sized recycling containers to the air-water separator of the present invention.

[0037] FIG. 4 a is a schematic view of an embodiment of a recycling container and cap system of the invention.

[0038] Fig. 4 b is a schematic perspective depiction of an embodiment of a recycling container and cap system of the invention.

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[0039] FIG. 5 a is a schematic inside view of an embodiment of a recycling cap for the recycling containers of the invention.

[0040] Fig. 5 b is a schematic depiction of a recycling cap according to the invention fitting on a partial view of a recycling container according to the invention.

[0041] 1-Backplate

[0042] 2-Waste Inlet (from dental practice)

[0043] 3-Air/water Separator Top

[0044] 4-Top Support Bracket

[0045] 5-Air/Water Separation Tank

[0046] 6-Suction tube

[0047] 7-Air/Water Separator Base

[0048] 8-0utlet Tube (to vacuum system)

[0049] 9-Recycling Container Top

[0050] 10-Lower Support Bracket

[0051] 11-Restrictor

[0052] 12-Detachable Recycling Container

[0053] 13-Retaining Pins (2)

[0054] 14- air-water separator tank effluent outlet port

[0055] 15- recycling container inlet port

[0056] 16- recycling container outlet port

[0057] 17- recycling container threads

[0058] 18- two tier recycling cap

[0059] 19- O-ring groove

[0060] 20- cap plugs

[0061] 21- O-ring

[0062] Figure 6A is a schematic view of a first embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0063] Figure 6B is a schematic view of the same embodiment, viewing the top of the container from directly above.

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[0064] Figure 7A is a schematic view of a second embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0065] Figure 7B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0066] Figure 8A is a schematic view of a third embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0067] Figure 8B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0068] Figure 9A is a schematic view of a fourth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0069] Figure 9B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0070] Figure 10A is a schematic view of a fourth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0071] Figure 10B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0072] Figure 11A is a schematic view of a fifth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0073] Figure 11B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0074] Figure 12A is a schematic view of a sixth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0075] Figure 12B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0076] Figure 13A is a schematic view of a seventh embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0077] Figure 13B is a schematic view of the same embodiment, viewing the top of the container from directly above.

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[0078] Figure 14A is a schematic view of a eighth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0079] Figure 14B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0080] Figure 15A is a schematic view of a ninth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0081] Figure 15B is a schematic view of the same embodiment, viewing the top of the container from directly above.

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

[0082] According to one aspect of the instant invention, an apparatus is provided for removing and recycling metal-containing particles and other waste particles from effluent, particularly effluent from a dental office. While herein the term "metal particles" may frequently be employed, it is contemplated that the apparatus is capable of separating other solid particles from effluent liquid.

[0083] According to one aspect of the invention, an apparatus for removing metal particles and other solid particles from liquid suction effluent can be installed in a dental office using a pre-existing suction/vacuum pump system. The apparatus may share a common vacuum pump with conventional dental chair suction apparatus, without interrupting the use of suction equipment at the dental chairs.

[0084] Removal of solid particles from liquid suction effluent is effected by sedimentation.

[0085] In accordance with a one embodiment of the invention, the dental office suction effluent is passed from dental chair suction equipment outlets to an air water separator tank via a suitable inlet port for the tank. The air-water separator tank in turn passes effluent into a sedimentary deposit tank, closed on all sides when in use and preferably readily detachable for emptying or replacement.

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[0086] In certain aspects of the instant invention the sedimentary deposit tank has a secondary function as a recycling container. In another aspect of the invention this recycling container can have features built in to make recycling easier and to reduce the amount of packaging and waste in the recycling system.

[0087] In another embodiment of the invention designed to minimize the space required to install the amalgam recycling system the air-water suction tube is internalized – within the air-water separator tank.

[0088] **Figure 1** and **Figure 2** shows two views of the separation apparatus according to the present invention in detail. Effluent from the dental chairs and a quantity of air are sucked through a suction apparatus exhaust conduit, through an air-water separator tank inlet **2**, and thence into an air-water separator tank **5**. The liquid effluent passes out of the air-water separator tank **5** via air-water separator tank outlet port **14**, while air passes downstream via the air suction tube **6** while maintaining constant vacuum upstream of amalgam separator.

[0089] The air-water separator tank effluent outlet port **14** passes effluent by gravity out of the air-water separator tank **5** and into the detachable recycling container **12** through the recycling container inlet port **15** for target particle separation by sedimentation. Solids settle and accumulate in the bottom of Recycle container **12**. Liquid content of waste flows primarily by gravity, although intermittently assisted by vacuum through Restrictor **11** which slows the flow rate of liquid to assist in sedimentation process and ultimately "clean" effluent discharge through the recycling container outlet port **16**.

[0090] Outlet ports **16** and inlet port **15** can be a variety of shapes and sizes, square, oval (as depicted), round or even more unusual shapes like a star. Preferred ports are those that provide a tight seal, allow for easy removal, and do not break. Oval or round are preferred embodiments. Round are most preferred.

[0091] A vacuum at the outlet tube **8** is generated when the vacuum pump is operating, thereby sucking air out of the air-water separator tank **5** via suction tube **6** while maintaining vacuum upstream of amalgam separator apparatus. Effluent from the recycling container **12** passes through the restrictor **11** where remaining non-settable fine particles are removed

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from the effluent and into the recycling container outlet port **16** to be discharged from the apparatus via common outlet tube **8.** Matter sucked by the vacuum pump, generally free of removed solids, is discharged via vacuum pump into a municipal drain of the public sewage system.

[0092] The system is provided with a simple back plate **1** for easy dental office placement as well as removable retaining pins **13** to ensure the recycling container does not detach from the air-water separation tank **5** when there is no vacuum in the system.

[0093] In certain embodiments, the recycling container ports **16** and **15** may be different heights in order to aid in alignment of the detachable recycling container **12** in the air-water separator base **7**. In a preferred embodiment, the outlet port **16** engages before the inlet port **15** while during removal the inlet port **15** disengages first. This causes a small volume of fluid to be pulled out of the collection container back into air-water separator tank **5** creating head space and eliminating upward force of vacuum which eases removal of recycle container **12** by operator. Existing devices require rocking, wiggling or applying extensive down force for removal of recycle container **12**.

[0094] In one preferred embodiment of the invention designed to minimize recycling costs and waste, the recycling container/sedimentary deposit tank has threads **17** built into the container to enable the addition of a liquid tight top for shipping.

[0095] **Figure 3** shows a schematic diagram of an adapter according to the invention to enable the use of recycling containers from a variety of sources that are lacking in correctly shaped ports **16** and **15** or otherwise are unable to fit the air-water separator tank **5** according to the invention due to shape differences.

[0096] **Figure 4 a** shows a schematic diagram of the recycling container and cap system (see **Figure 5** for more cap **18** detail) according to the present invention. The cap **18** is a two tier shape to allow for a tight grip by both a big and smaller hand in order to achieve a strong seal as required by the invention. An O-ring **21** is provided and fits into an O-ring groove on the recycling container **12**. Plugs **20** are used to provide a first leak proof seal for the recycling container **12**. These plugs **20** are held in place by the cap **18** when the cap is threaded onto the recycling container as depicted in **Figure 5b**.

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[0097] **Figures 6 through Figure 15** show several embodiments of the diagram of a recycling container of the present invention, which include the inlet port and outlet port on the top mating surface, and irregular keyways cast into the outer top mating surface.

[0098] Generally, under present practice, the dental staff will not be able to remove deposited sediment from the recycle container nor remove accumulated particle residues from the restrictor unit themselves. Thus, it is desirable that such removal be done by a competent effluent residue processing facility. Therefore, under present practice, it is expected to be preferred that the recycling container with its enclosed restrictor unit be removed when full, or periodically replaced by fresh tanks from time to time as required. The spent tank with an accumulation of metallic and other particles can then be sent to a processing facility for proper disposal of the targeted metallic particles, such as mercury, and recovery of precious metals such as silver.

[0099] Although the sedimentary deposit process is effective to remove a satisfactorily high proportion of the target particles desired to be removed from the effluent, the recycling container desirably includes an outlet restrictor right in the chamber to catch any floating materials as well as any other materials that did not settle out.

[00100] If the recycle container is not changed as required or filled beyond normal capacity, waste liquid from dental practice may back up into air water separator tank. Should this occur, effluent overflows through the air suction tube and into the outlet port and is discharged into the vacuum pump draw line and thence eventually into the municipal drain. However, it is desirable that the system should operate in such a manner as to avoid having the air-water separator tank become completely full, since effluent exiting through the air outlet port will contain particles that will not be separated by the separator. If, however, such a by-pass condition occurs at no time will the suction generated by the vacuum pump be lost or interrupted at the dental office.

[00101] In a further embodiment of the invention oriented towards large-scale institutional applications, in which many dental chairs or other sources of effluent are connected to the same suction and drain services, several parallel-connected recycling containers and associated apparatus, each such composite apparatus including a air-water

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separator tank and preferably one, or alternatively two attached recycling containers, may be operated in parallel to provide sufficient treatment capacity for large effluent volumes.

[00102] All publications, web-sites, patents and patent applications cited in the specification are hereby incorporated herein by reference in their entirety for the disclosure for which they are cited.

[00103] Having read the above specification, other alternatives and variants of the above described methods and apparatus suitable for practicing the methods will occur to those skilled in the technology. Such alternatives, modifications and variants fall within the scope of the present invention.

[00104] The invention as described above also includes the following non-limiting claims, which describe particular embodiments of the invention.

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Claims

1. A dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device, comprising:

   (a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device; an air-water separator tank liquid effluent outlet; and an air-water separator tank air outlet;

   (b) a detachable recycling container, said recycling container acting primarily under the influence of gravity to cause settlement of said particles; said recycling container having a recycling container effluent inlet port connected to said air-water separator tank liquid effluent outlet; and said recycling container further having an effluent outlet port;

   (c) wherein the air-water separator tank also includes an internal suction conduit;

   (d) wherein the recycling container comprises threads;

   (e) wherein the recycling container effluent inlet port and the recycling container outlet port are not the same height.

2. The dental amalgam recycling system of claim 1, further comprising: (f) a threaded shipping cap for said recycling container; and

3. The dental amalgam recycling system according to claim 1, further comprising a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port.

4. A dental amalgam recycling system according to claim 3 wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

5. A dental amalgam recycling system according to claim 4 further comprising an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

6. A dental amalgam recycling container comprising threads for attachment of a shipping cap.

7. A dental amalgam recycling container according to claim 6 further comprising two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks.

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8. A dental amalgam recycling container according to claim 7 further comprising a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal.

9. An adapter for an air-water separator tank wherein the adapter enables a recycling container without compatible effluent ports to attach to the air-water separator tank of the dental amalgam recycling system of claim 1.

10. An adapter according to claim 9, wherein the adapter is without threads.

11. A dental amalgam recycling system according to claim 1, wherein said recycling container further comprises one or more irregular keyways cast into its outside top mating surface; and said air-water separation tank has one or more keys cast into its mating surface, such that the keys of the air-water separation tank and the keyways of said recycling container must be aligned in order for said recycling container and said air-water separation tank to mate securely.

12. A dental amalgam recycling system according to claim 2, wherein said recycling container further comprises one or more irregular keyways cast into its outside top mating surface; and said threaded shipping cap has one or more keys cast into its mating surface, such that the keys of said shipping cap and the keyways of said recycling container must be aligned in order for said recycling container and said shipping cap to mate securely.

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ABSTRACT

The present invention provides dental amalgam recycling systems, useful for recycling particles from a dental liquid effluent drawn, for example, from a suctioning device.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Examiner: LUCCHESI, Nicholas
MOZZICATO	Group Art Unit: 3732
Application No.: 15/730,828	Confirmation No. 9884
Filed: October 12, 2017	
For: DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM	

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

Sir:

PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. § 1.136

This is a request under the provisions of 37 C.F.R. § 1.136(a) to extend the period for filing a reply in the above-identified application until July 26, 2018, for a period of three under months (37 C.F.R. §1.17(a)(3), extending the time for response up to January 28, 2019.

The small entity fee in the amount of $700.00 is submitted herewith. Applicant claims small entity status under 37 C.F.R. §1.27. Applicants' undersigned representative may be reached by telephone at 617-966-2374. All correspondence should continue to be directed to the listed correspondence address.

Respectfully submitted,

/Steven R. Lazar/

Steven R. Lazar
Attorney for Applicants
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SRL Patents and Licensing
234 Broadway
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January 28, 2019

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Electronic Patent Application Fee Transmittal

Application Number:	15730828
Filing Date:	12-Oct-2017
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
			Total in USD ($)	**700**

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Electronic Acknowledgement Receipt

EFS ID:	34983756
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	28-JAN-2019
Filing Date:	12-OCT-2017
Time Stamp:	18:11:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$700
RAM confirmation Number	012919INTEFSW18113500
Deposit Account	
Authorized User	

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		01-SMTX-0001-OA-Response_1-28-2019.pdf	184042 f4f921580f37528bbe6d25938baa99d1d42df2a7	yes	24
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	6	
	Claims		7	11	
	Applicant Arguments/Remarks Made in an Amendment		12	24	
Warnings:					
Information:					
2	Specification	02-SMTX-001_Non-Prov_01-28-2019-SUBSTITUTE-SPECIFICATION-CLEAN.pdf	119375 b2b1b0fbf267aa5c951d2ec101ce9143b0afa04a	no	16
Warnings:					
Information:					
3	Specification	03-SMTX-001_Non-Prov_01-28-2019-SUBSTITUTE-SPECIFICATION-MARKUP.pdf	112011 f10d876f0b0c80646fc31dc53e5fd06ccd5b617d	no	17
Warnings:					
Information:					
4	Drawings-only black and white line drawings	04-SMTX-T1-Replacement-Figs-1-5_01-28-2019.pdf	511153 c7a4346a72b01578700aae19db28e9faa7ad27c3	no	6
Warnings:					
Information:					
5	Drawings-only black and white line drawings	05-SMTX-T1-Figures-6-15_01-28-2019.pdf	470540 7bd53415101ee92020edb0b96cfb6b5a8766fad9	no	20

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Warnings:					
Information:					
6	Extension of Time	06-SMTX-0001-OA-PETEXT_1-28-2019.pdf	58758 c4addbe761abff9cf665e4dcfbb677c8ecdd d56b	no	1
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	30192 4001770d4a41995949e957a0c89c5d62257 08d69	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1486071	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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For: DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM	)	

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

RESPONSE TO OFFICE ACTION

Sir:

In response to the Office Action, mailed on July 26, 2018, a petition for a three-month extension of time for response being filed along herewith, Applicants respond as follows:

1. Applicants submit herewith the $700.00 fee for a one-month extension of time, (small entity), to extend the time to respond until January 28, 2019.
2. Amendments to the Specification begin on page 2.
3. Amendments to the Drawings begin on page 6.
4. Amendments to the Claims begin on page 7.
5. Remarks begin on page 12.

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IN THE SPECIFICATION:

Applicants submit herewith substantial amendments to the specification, which Applicant considers may will change the pagination. Hence, in addition to setting forth the amendments below, Applicant is submitting herewith a substitute specification, in both marked and unmarked form, as specified in 37 C.F.R. §1.125.

On page 1, after the Title, and before "FIELD OF THE INVENTION," please insert the following paragraph:

- - RELATED APPLICATIONS

[0001] This patent application claims priority from provisional patent application serial number 62/414,712, filed on October 29, 2016; and provisional patent application serial number 62/406,990, filed on October 12, 2016. This application further claims priority from patent application serial number 29/667,212, filed October 19, 2018, which is a continuation of serial number 29/585,659, filed on November 28, 2016, now patent number D835,778. This patent application further claims priority from patent application serial number 29/585,674, filed on November 28, 2016. This patent application further claims priority from patent application serial number 29/672,887, filed on December 10, 2018, which is a continuation of patent application serial number 29/585,668, filed on November 28, 2016, now patent number D835,779. This patent application further claims priority from patent application serial number 29/577,701, filed on September 14, 2016. This patent application further claims priority from patent application serial number 29/567,544, filed on June 9, 2016. This patent application further claims priority from patent application serial number 29/671,943, filed on November 30, 2018, which is a continuation

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of patent application serial number 29/555,622, filed on May 23, 2016, now issued patent D835,264. - -

On page 8, after paragraph [0060], which is re-numbered as paragraph [0061], please add the following paragraphs:

- - [0062] Figure 6A is a schematic view of a first embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0063] Figure 6B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0064] Figure 7A is a schematic view of a second embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0065] Figure 7B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0066] Figure 8A is a schematic view of a third embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0067] Figure 8B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0068] Figure 9A is a schematic view of a fourth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0069] Figure 9B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0070] Figure 10A is a schematic view of a fourth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0071] Figure 10B is a schematic view of the same embodiment, viewing the top of the container from directly above.

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[0072] Figure 11A is a schematic view of a fifth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0073] Figure 11B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0074] Figure 12A is a schematic view of a sixth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0075] Figure 12B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0076] Figure 13A is a schematic view of a seventh embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0077] Figure 13B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0078] Figure 14A is a schematic view of a eighth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0079] Figure 14B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0080] Figure 15A is a schematic view of a ninth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0081] Figure 15B is a schematic view of the same embodiment, viewing the top of the container from directly above. - -

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On page 12, after paragraph [0095], which has been renumbered as [0096], add the following:

- - [0097] **Figures 6 through Figure 15** show several embodiments of the diagram of a recycling container of the present invention, which include the inlet port and outlet port on the top mating surface, and irregular keyways cast into the outer top mating surface. - -

Addition of the above results in a difference in pagination and paragraph numbers throughout the entire application. For this reason, Applicants submit herewith a substitute specification in which the above text has been added, and the pagination and paragraph numbering has been changed. The substitute specification is presented in both a clean and a marked-up form.

No new matter is introduced as a result of the above amendments.

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AMENDMENTS TO THE DRAWINGS:

Please add new Figures 6 through 15.

A new complete set of replacement drawings has been submitted, with the drawings indicated to be "Replacement Sheet" or "New Sheet" as applicable. New Figures 6 through 15 have been incorporated from earlier file patent application serial number 29/577,701, filed on September 14, 2016, to which the present application claims priority.

No new matter is introduced as a result of the above amendments and new drawings, as they are fully supported by the priority documents recited herein.

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DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

RELATED APPLICATIONS

[001] This patent application claims priority from provisional patent application serial number 62/414,712, filed on October 29, 2016; and provisional patent application serial number 62/406,990, filed on October 12, 2016. This application further claims priority from patent application serial number 29/667,212, filed October 19, 2018, which is a continuation of serial number 29/585,659, filed on November 28, 2016, now patent number D835,778. This patent application further claims priority from patent application serial number 29/585,674, filed on November 28, 2016. This patent application further claims priority from patent application serial number 29/672,887, filed on December 10, 2018, which is a continuation of patent application serial number 29/585,668, filed on November 28, 2016, now patent number D835,779. This patent application further claims priority from patent application serial number 29/577,701, filed on September 14, 2016. This patent application further claims priority from patent application serial number 29/567,544, filed on June 9, 2016. This patent application further claims priority from patent application serial number 29/671,943, filed on November 30, 2018, which is a continuation of patent application serial number 29/565,622, filed on May 23, 2016, now issued patent D835,264.

FIELD OF THE INVENTION

[002] This invention relates to systems and apparatus suitable to remove particles from effluent waste, and particularly, to remove amalgam and other metallic particles and other abrasive solids from dental office suction effluent. The system also comprises a self contained recycling container to facilitate customer regulatory compliance and environmental safeguards.

BACKGROUND OF THE INVENTION

[003] Dental amalgam is a dental filling material used to fill cavities caused by tooth decay. It has been used for more than 150 years in hundreds of millions of patients around the world.

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[004] Dental amalgam is a mixture of metals, consisting of liquid (elemental) mercury and a powdered alloy composed of silver, tin, and copper. Approximately 50% of dental amalgam is elemental mercury by weight. The chemical properties of elemental mercury allow it to react with and bind together the silver/copper/tin alloy particles to form an amalgam. See http://www.fda.gov/MedicalDevices/ProductsandMedical Procedures/DentalProducts/DentalAmalgam/ucm171094.htm, accessed September 9, 2016.

[005] Amalgam is used less often than in the past, mostly because tooth-colored materials now can be used. However, the newer materials can't be used for all dental situations, amalgam is less costly than newer materials and it lasts longer, especially in teeth that undergo a lot of pressure and wear from chewing.

[006] Better dental health overall coupled with increased demand for more modern alternatives such as resin composite fillings (which match the tooth color), as well as public concern about the mercury content of dental amalgam, have resulted in a steady decline in dental amalgam use in developed countries, though overall amalgam use continues to rise worldwide. Stein, PS; Sullivan, J; Haubenreich, JE; Osborne, PB (2005). "Composite resin in medicine and dentistry". Journal of long-term effects of medical implants. 15 (6): 641–54. doi:10.1615/jlongtermeffmedimplants. v15.i6.70. PMID 16393132.

[007] Although amalgams are less frequently used in developed countries for new dental fillings than in the past, amalgams continue to make up a portion of the particle component of dental office effluent mainly because of the fact that old fillings made of amalgams are drilled out and removed in the effluent waste when new fillings are effected to replace the old. Further, as noted above, even under current dental practice, an amalgam is preferred for some tooth filling situations.

[008] Because mercury is a poison that can accumulate in living tissues and can pose a health hazard to species in a food chain exposed to mercury-containing compounds, and since humans are inevitably at the end of the food chain, it follows that effluent containing amalgams can pose a health hazard to the community at large. Also, certain metals such as silver are commercially valuable if recovered in quantity. For those reasons, it is desirable to devise systems, apparatus and processes for removing amalgams from dental office effluent and efficiently recycling those amalgams.

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[009] In addition to removing amalgams, other matter disposed into dental office suction effluent includes aluminum oxides used in air abrasion treatments and other solid waste material. These solid materials tend to wear out or damage vacuum pumps and other equipment downstream of the dental chair suction apparatus, and also constitute effluent water contaminants. Therefore, it is desirable for the apparatus to remove solid abrasive material and other particulate waste from the dental office suction effluent.

[0010] The World Health Organization also points out that amalgam separators, installed in the waste water lines of many dental offices, dramatically decrease the release of mercury into the public sewer system. However, critics say that the separators are still not mandatory in some states of the United States. "Purchasing, installing and operating dental amalgam separators: Practical issues". The Journal of the American Dental Association. 134 (8): 1054–65. doi:10.14219/jada.archive.2003.0319. PMID 12956345. Recently, the EPA has enacted nation-wide regulations requiring amalgam separators in dental offices.

[0011] Previously known apparatus for removing amalgam particles from dental office suction effluent are known to include a collecting tank for collecting a day's accumulation of suction effluent from one or more sources of such waste. The waste is sucked from the dental chair suction apparatus and into the collecting tank by a vacuum pump. When the vacuum pump is turned off, an outlet valve is opened and the accumulated waste is deposited into a separation device intended to separate metal particles from the effluent liquid. Flow into the separation device is induced by the head of fluid in the collecting tank. Particles passing through the separation device are separated from the waste by gravity and settle to the bottom of the separation device. The flow rate is dependent on the head inside the collecting tank; as the head diminishes, the flow rate also diminishes. The changes in flow rate are undesirable because the particle separation rate is affected, and the system becomes prone to plugging when the flow rate decreases. Also, since the waste can be deposited only when the vacuum pump is off, waste is usually moved to the separation device at the end of the day. As a result, the collecting tank and separation device tend to be undesirably large and the whole process is time consuming.

[0012] Another known apparatus is a centrifuge type system that separates heavier metal particles from effluent liquid by collecting the particles at the peripheral wall of the

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centrifuge. This apparatus does not effectively separate lighter particles, and is expensive to purchase and operate due to the complexity of its mechanical parts.

[0013] Yet another known apparatus uses a dedicated mechanical pump to suction waste liquids through a separator device. Again, a dedicated pump can be expensive to purchase and to maintain, and can be undesirably space-consuming.

[0014] Such known systems can become quite complex, unwieldy and expensive, as for example that disclosed in U.S. Pat. No. 5,885,076 granted 23 Mar. 1999. It teaches the use of sedimentation, co-precipitation and filtration in an expensive complicated apparatus that is probably economical, if at all, only for relatively large installations such as a military base dental complex.

[0015] U.S. Pat. No. 6,692,636 and U.S. Pat. No. 6,596,754 are patents that disclose systems for removing amalgam from dental office suction effluent.

[0016] After collecting the amalgam and other solid waste the dentist is left with the problem of what to do with the waste. Either the dentist has to deal with his own hazardous waste or he can send his collected material to a recycler. In either case, the "collection container" needs to be disposable and easily replaceable.

[0017] Existing recycling programs generally require the provision of bulky shipping materials and the delivery of those materials to the dentist for every full container. If such materials are not provided and the materials are not properly recycled a large part of the benefit of collecting the amalgam waste can be lost. It is important that the waste is recycled under federal guidelines in order to make sure the full benefits of amalgam separation are achieved.

[0018] Additionally, containers for collection, such as dental amalgam recycling systems, can be compromised by incorrect installation or misalignment, which can cause O-rings to deform and/or seal irregularly, and result in leakage.

SUMMARY OF THE INVENTION

[0019] The present invention overcomes many of the shortcomings of the prior technology and achieves further advantages that will be apparent after reviewing the following detailed description.

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[0020] In one aspect, the invention comprises a dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device. In certain embodiments, the dental amalgam recycling system of the invention comprises:

[0021] (a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device, an air-water separator tank liquid effluent outlet and an air-water separator tank air outlet;

[0022] (b) a detachable recycling container, said recycling container acting primarily under the influence of gravity to cause settlement of said particles; said recycling container having a recycling container effluent inlet port connected to said air-water separator tank liquid effluent outlet and said recycling container further having an effluent outlet port;

[0023] (c) wherein the air-water separator tank also includes an internal suction conduit;

[0024] (d) wherein the recycling container comprises threads;

[0025] (e) wherein the recycling container effluent inlet port and the recycling container outlet port are not the same height.

[0026] In certain embodiments, the dental amalgam recycling system further comprises (f) a threaded shipping cap, wherein the threads of the shipping cap and the threads of the recycling container are complementary such that, when the shipping cap is fitted in place, the shipping cap forms a tight seal with said recycling container.

[0027] While in use, the dental amalgam recycling system is functionally associated with a vacuum pump having a vacuum pump inlet. The vacuum pump is typically a pre-existing part of the dental office facility. In particular embodiments, the dental amalgam recycling system is physically connected with a vacuum pump via a suction conduit in the air-water separator. In certain preferred embodiments, the suction conduit is an internal suction conduit within the air-water separator.

[0028] In certain embodiments, the dental amalgam recycling system of the invention further comprise a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port. Said first and second plugs may be held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

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[0029] In certain embodiments, the dental amalgam recycling system of the invention further comprise an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

[0030] In certain embodiments, the invention comprises a container, useful as a dental amalgam recycling container, comprising threads for attachment of a shipping cap. In certain embodiments, the dental amalgam recycling container further comprises two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks. The dental amalgam recycling containers of the present invention may further comprise a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal.

[0031] In certain embodiments, the invention comprises an adapter for an air-water separator tank, wherein the adapter enables a recycling container without compatible effluent ports to attach to an air-water separator tank. Said air-water separator tank may comprise, for example, a component of a dental amalgam recycling system, as described above. In certain embodiments, the adapter may comprise threads. In alternative embodiments, the adaptor may be without threads.

[0032] As described above, the potential for leakage exists in a collection canister such as a recycling container used in the dental amalgam recycling systems described herein. Such leakage may occur, for example, due to incorrect installation, or due to misalignment of a container and its intended mating partner, such as the air-water separation tank or its intended cap, such as a threaded shipping cap, which may cause O-rings to deform and/or seal irregularly. In order to address this problem and/or reduce the potential for leakage, a collection canister, such as a recycling container used in a dental amalgam recycling system, may have one or more irregular 'keyways' cast into its outside top mating surface, and the intended mating partner, such as the air-water separation tank, or the shipping cap, may have one or more corresponding 'key(s)' be cast into its mating surface, such that the key(s) and keyway(s) must be aligned in order for the collection canister (e.g., the recycling container) and its mating partner (e.g., the air-water separation tank; or the shipping cap) to mate properly. This key/keyway system can help ensure even pressure across the entire circumference of the O-ring surface on each port. Similarly, such key(s) and keyway(s) may be

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used to ensure proper replacement of the container and/or the air-water separation tank, such that incorrect replacement can be avoided or minimized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] FIG. 1 is a schematic front view of an embodiment of particle removal and recycling apparatus according to the invention, for particular use in a dental office.

[0034] FIG. 2 is a schematic side view of an embodiment of particle removal and recycling apparatus according to the invention, for particular use in a dental office.

[0035] FIG. 3 a is a schematic view of an embodiment of a universal adapter for fitting various different sized recycling containers to the air-water separator of the present invention.

[0036] FIG. 3 b is a schematic view of an alternative embodiment of a universal adapter for fitting various different sized recycling containers to the air-water separator of the present invention.

[0037] FIG. 4 a is a schematic view of an embodiment of a recycling container and cap system of the invention.

[0038] Fig. 4 b is a schematic perspective depiction of an embodiment of a recycling container and cap system of the invention.

[0039] FIG. 5 a is a schematic inside view of an embodiment of a recycling cap for the recycling containers of the invention.

[0040] Fig. 5 b is a schematic depiction of a recycling cap according to the invention fitting on a partial view of a recycling container according to the invention.

[0041] 1-Backplate

[0042] 2-Waste Inlet (from dental practice)

[0043] 3-Air/water Separator Top

[0044] 4-Top Support Bracket

[0045] 5-Air/Water Separation Tank

[0046] 6-Suction tube

[0047] 7-Air/Water Separator Base

[0048] 8-0utlet Tube (to vacuum system)

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[0049] 9-Recycling Container Top

[0050] 10-Lower Support Bracket

[0051] 11-Restrictor

[0052] 12-Detachable Recycling Container

[0053] 13-Retaining Pins (2)

[0054] 14- air-water separator tank effluent outlet port

[0055] 15- recycling container inlet port

[0056] 16- recycling container outlet port

[0057] 17- recycling container threads

[0058] 18- two tier recycling cap

[0059] 19- O-ring groove

[0060] 20- cap plugs

[0061] 21- O-ring

[0062] Figure 6A is a schematic view of a first embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0063] Figure 6B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0064] Figure 7A is a schematic view of a second embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0065] Figure 7B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0066] Figure 8A is a schematic view of a third embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0067] Figure 8B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0068] Figure 9A is a schematic view of a fourth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0069] Figure 9B is a schematic view of the same embodiment, viewing the top of the container from directly above.

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[0070] Figure 10A is a schematic view of a fourth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0071] Figure 10B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0072] Figure 11A is a schematic view of a fifth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0073] Figure 11B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0074] Figure 12A is a schematic view of a sixth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0075] Figure 12B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0076] Figure 13A is a schematic view of a seventh embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0077] Figure 13B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0078] Figure 14A is a schematic view of a eighth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0079] Figure 14B is a schematic view of the same embodiment, viewing the top of the container from directly above.

[0080] Figure 15A is a schematic view of a ninth embodiment of a detachable container according to the present invention, viewing the top of the container at an angle.

[0081] Figure 15B is a schematic view of the same embodiment, viewing the top of the container from directly above.

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

[0082] According to one aspect of the instant invention, an apparatus is provided for removing and recycling metal-containing particles and other waste particles from effluent, particularly effluent from a dental office. While herein the term “metal particles” may

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frequently be employed, it is contemplated that the apparatus is capable of separating other solid particles from effluent liquid.

[0083] According to one aspect of the invention, an apparatus for removing metal particles and other solid particles from liquid suction effluent can be installed in a dental office using a pre-existing suction/vacuum pump system. The apparatus may share a common vacuum pump with conventional dental chair suction apparatus, without interrupting the use of suction equipment at the dental chairs.

[0084] Removal of solid particles from liquid suction effluent is effected by sedimentation.

[0085] In accordance with a one embodiment of the invention, the dental office suction effluent is passed from dental chair suction equipment outlets to an air water separator tank via a suitable inlet port for the tank. The air-water separator tank in turn passes effluent into a sedimentary deposit tank, closed on all sides when in use and preferably readily detachable for emptying or replacement.

[0086] In certain aspects of the instant invention the sedimentary deposit tank has a secondary function as a recycling container. In another aspect of the invention this recycling container can have features built in to make recycling easier and to reduce the amount of packaging and waste in the recycling system.

[0087] In another embodiment of the invention designed to minimize the space required to install the amalgam recycling system the air-water suction tube is internalized – within the air-water separator tank.

[0088] **Figure 1** and **Figure 2** shows two views of the separation apparatus according to the present invention in detail. Effluent from the dental chairs and a quantity of air are sucked through a suction apparatus exhaust conduit, through an air-water separator tank inlet **2**, and thence into an air-water separator tank **5**. The liquid effluent passes out of the air-water separator tank **5** via air-water separator tank outlet port **14**, while air passes downstream via the air suction tube **6** while maintaining constant vacuum upstream of amalgam separator.

[0089] The air-water separator tank effluent outlet port **14** passes effluent by gravity out of the air-water separator tank **5** and into the detachable recycling container **12** through

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the recycling container inlet port **15** for target particle separation by sedimentation. Solids settle and accumulate in the bottom of Recycle container **12**. Liquid content of waste flows primarily by gravity, although intermittently assisted by vacuum through Restrictor **11** which slows the flow rate of liquid to assist in sedimentation process and ultimately "clean" effluent discharge through the recycling container outlet port **16**.

[0090] Outlet ports **16** and inlet port **15** can be a variety of shapes and sizes, square, oval (as depicted), round or even more unusual shapes like a star. Preferred ports are those that provide a tight seal, allow for easy removal, and do not break. Oval or round are preferred embodiments. Round are most preferred.

[0091] A vacuum at the outlet tube **8** is generated when the vacuum pump is operating, thereby sucking air out of the air-water separator tank **5** via suction tube **6** while maintaining vacuum upstream of amalgam separator apparatus. Effluent from the recycling container **12** passes through the restrictor **11** where remaining non-settable fine particles are removed from the effluent and into the recycling container outlet port **16** to be discharged from the apparatus via common outlet tube **8.** Matter sucked by the vacuum pump, generally free of removed solids, is discharged via vacuum pump into a municipal drain of the public sewage system.

[0092] The system is provided with a simple back plate **1** for easy dental office placement as well as removable retaining pins **13** to ensure the recycling container does not detach from the air-water separation tank **5** when there is no vacuum in the system.

[0093] In certain embodiments, the recycling container ports **16** and **15** may be different heights in order to aid in alignment of the detachable recycling container **12** in the air-water separator base **7**. In a preferred embodiment, the outlet port **16** engages before the inlet port **15** while during removal the inlet port **15** disengages first. This causes a small volume of fluid to be pulled out of the collection container back into air-water separator tank **5** creating head space and eliminating upward force of vacuum which eases removal of recycle container **12** by operator. Existing devices require rocking, wiggling or applying extensive down force for removal of recycle container **12**.

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[0094] In one preferred embodiment of the invention designed to minimize recycling costs and waste, the recycling container/sedimentary deposit tank has threads **17** built into the container to enable the addition of a liquid tight top for shipping.

[0095] **Figure 3** shows a schematic diagram of an adapter according to the invention to enable the use of recycling containers from a variety of sources that are lacking in correctly shaped ports **16** and **15** or otherwise are unable to fit the air-water separator tank **5** according to the invention due to shape differences.

[0096] **Figure 4 a** shows a schematic diagram of the recycling container and cap system (see **Figure 5** for more cap **18** detail) according to the present invention. The cap **18** is a two tier shape to allow for a tight grip by both a big and smaller hand in order to achieve a strong seal as required by the invention. An O-ring **21** is provided and fits into an O-ring groove on the recycling container **12**. Plugs **20** are used to provide a first leak proof seal for the recycling container **12**. These plugs **20** are held in place by the cap **18** when the cap is threaded onto the recycling container as depicted in **Figure 5b**.

[0097] **Figures 6 through Figure 15** show several embodiments of a recycling container of the present invention, which include the inlet port and outlet port on the top mating surface, and irregular keyways cast into the outer top mating surface.

[0098] Generally, under present practice, the dental staff will not be able to remove deposited sediment from the recycle container nor remove accumulated particle residues from the restrictor unit themselves. Thus, it is desirable that such removal be done by a competent effluent residue processing facility. Therefore, under present practice, it is expected to be preferred that the recycling container with its enclosed restrictor unit be removed when full, or periodically replaced by fresh tanks from time to time as required. The spent tank with an accumulation of metallic and other particles can then be sent to a processing facility for proper disposal of the targeted metallic particles, such as mercury, and recovery of precious metals such as silver.

[0099] Although the sedimentary deposit process is effective to remove a satisfactorily high proportion of the target particles desired to be removed from the effluent, the recycling container desirably includes an outlet restrictor right in the chamber to catch any floating materials as well as any other materials that did not settle out.

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[00100] If the recycle container is not changed as required or filled beyond normal capacity, waste liquid from dental practice may back up into air water separator tank. Should this occur, effluent overflows through the air suction tube and into the outlet port and is discharged into the vacuum pump draw line and thence eventually into the municipal drain. However, it is desirable that the system should operate in such a manner as to avoid having the air-water separator tank become completely full, since effluent exiting through the air outlet port will contain particles that will not be separated by the separator. If, however, such a by-pass condition occurs at no time will the suction generated by the vacuum pump be lost or interrupted at the dental office.

[00101] In a further embodiment of the invention oriented towards large-scale institutional applications, in which many dental chairs or other sources of effluent are connected to the same suction and drain services, several parallel-connected recycling containers and associated apparatus, each such composite apparatus including a air-water separator tank and preferably one, or alternatively two attached recycling containers, may be operated in parallel to provide sufficient treatment capacity for large effluent volumes.

[00102] All publications, web-sites, patents and patent applications cited in the specification are hereby incorporated herein by reference in their entirety for the disclosure for which they are cited.

[00103] Having read the above specification, other alternatives and variants of the above described methods and apparatus suitable for practicing the methods will occur to those skilled in the technology. Such alternatives, modifications and variants fall within the scope of the present invention.

[00104] The invention as described above also includes the following non-limiting claims, which describe particular embodiments of the invention.

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Claims

1. A dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device, comprising:

   (a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device; an air-water separator tank liquid effluent outlet; and an air-water separator tank air outlet;

   (b) a detachable recycling container, said recycling container acting primarily under the influence of gravity to cause settlement of said particles; said recycling container having a recycling container effluent inlet port connected to said air-water separator tank liquid effluent outlet; and said recycling container further having an effluent outlet port;

   (c) wherein the air-water separator tank also includes an internal suction conduit;

   (d) wherein the recycling container comprises threads;

   (e) wherein the recycling container effluent inlet port and the recycling container outlet port are not the same height.

2. The dental amalgam recycling system of claim 1, further comprising: (f) a threaded shipping cap for said recycling container; and

3. The dental amalgam recycling system according to claim 1, further comprising a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port.

4. A dental amalgam recycling system according to claim 3 wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

5. A dental amalgam recycling system according to claim 4 further comprising an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

6. A dental amalgam recycling container comprising threads for attachment of a shipping cap.

7. A dental amalgam recycling container according to claim 6 further comprising two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks.

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8. A dental amalgam recycling container according to claim 7 further comprising a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal.

9. An adapter for an air-water separator tank wherein the adapter enables a recycling container without compatible effluent ports to attach to the air-water separator tank of the dental amalgam recycling system of claim 1.

10. An adapter according to claim 9, wherein the adapter is without threads.

11. A dental amalgam recycling system according to claim 1, wherein said recycling container further comprises one or more irregular keyways cast into its outside top mating surface; and said air-water separation tank has one or more keys cast into its mating surface, such that the keys of the air-water separation tank and the keyways of said recycling container must be aligned in order for said recycling container and said air-water separation tank to mate securely.

12. A dental amalgam recycling system according to claim 2, wherein said recycling container further comprises one or more irregular keyways cast into its outside top mating surface; and said threaded shipping cap has one or more keys cast into its mating surface, such that the keys of said shipping cap and the keyways of said recycling container must be aligned in order for said recycling container and said shipping cap to mate securely.

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ABSTRACT

The present invention provides dental amalgam recycling systems, useful for recycling particles from a dental liquid effluent drawn, for example, from a suctioning device.

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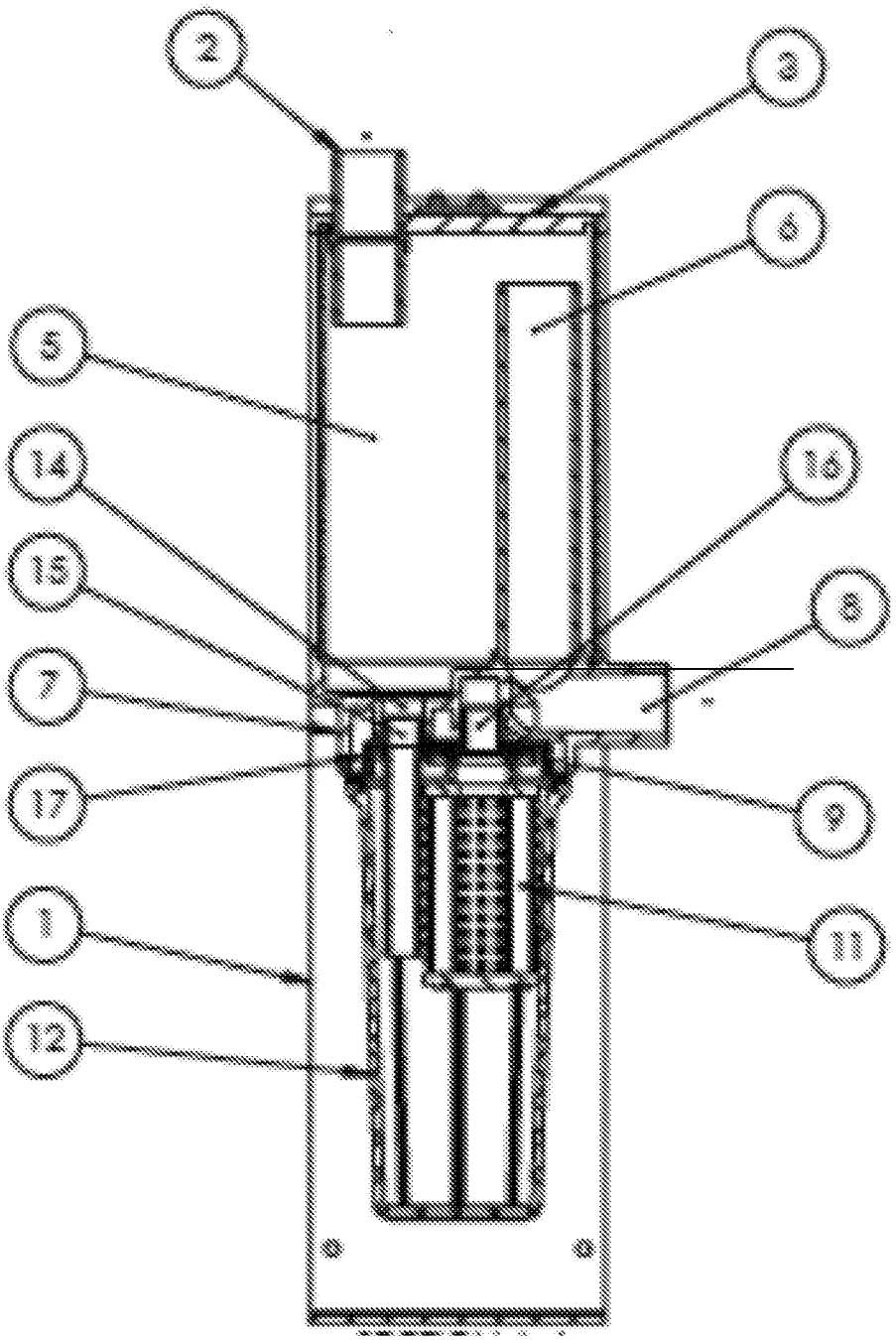
Figure 1



REPLACEMENT SHEET

Figure 2

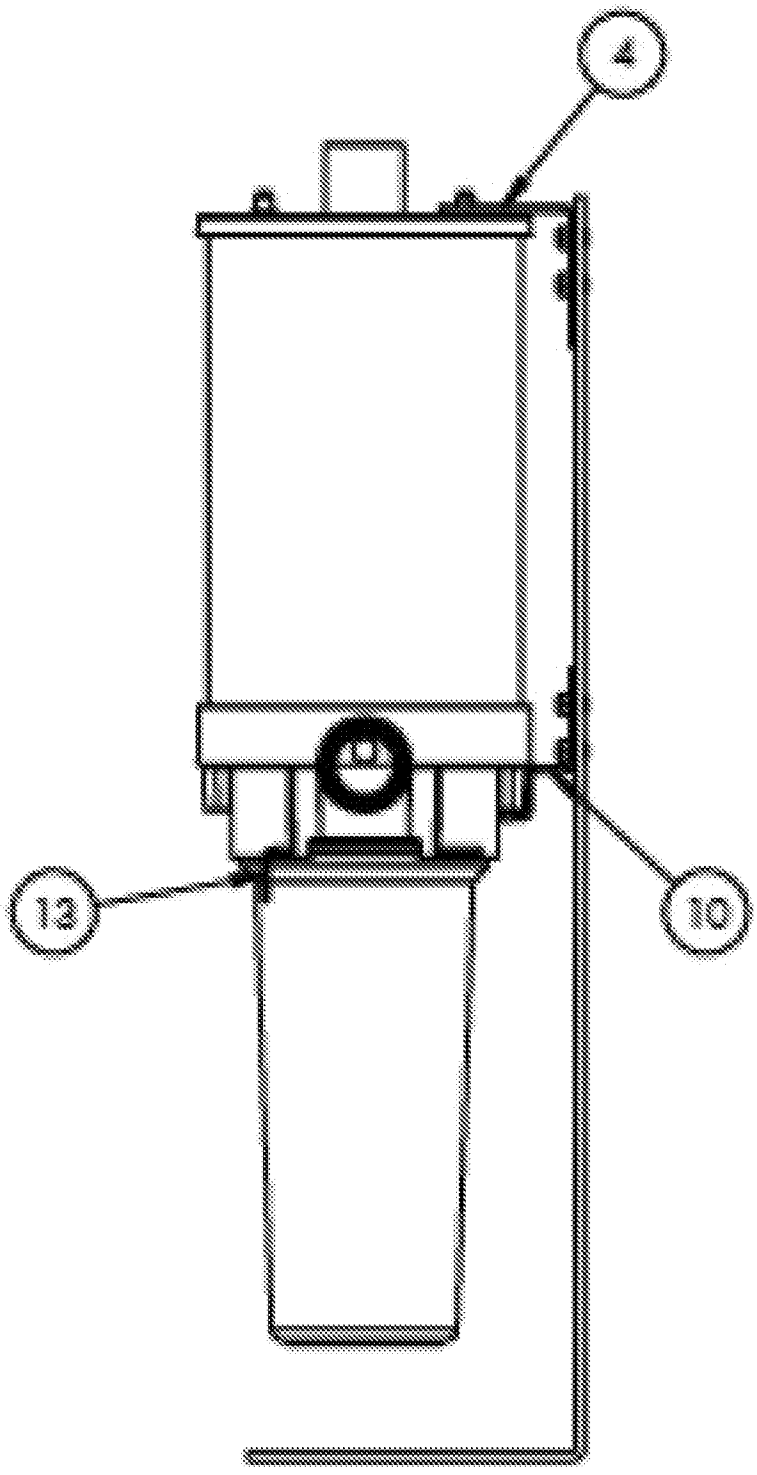


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Figure 3a.

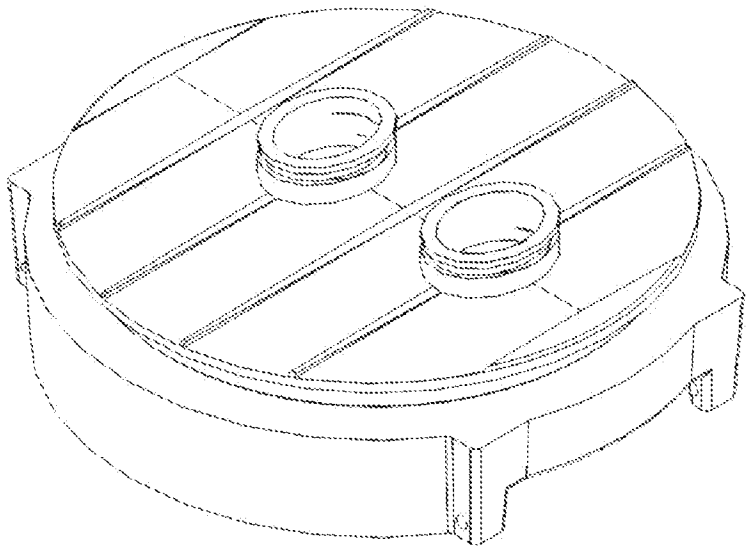

Figure 3b.

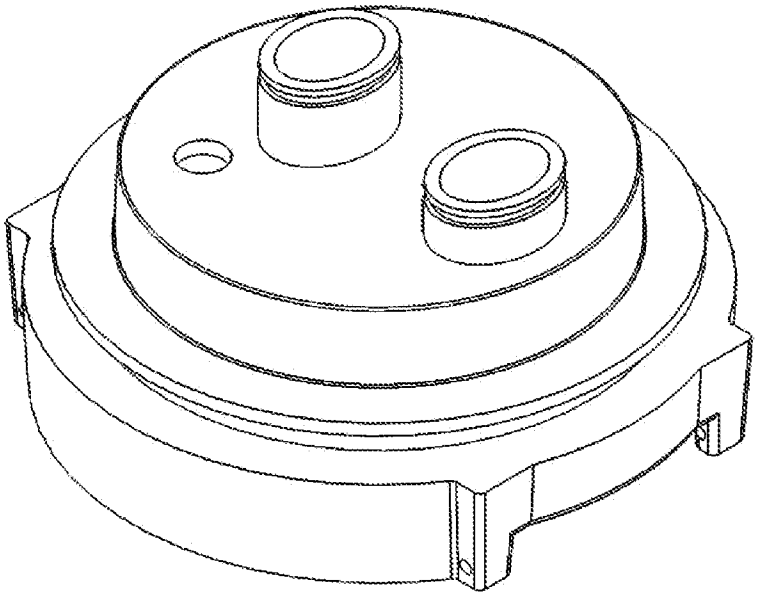

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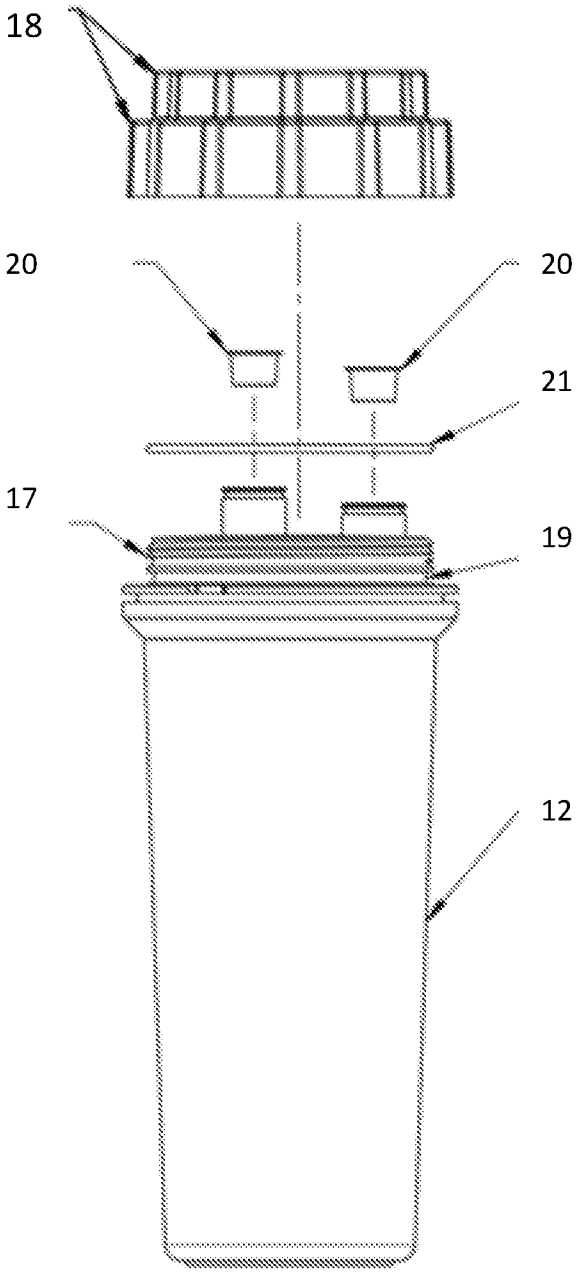
Figure 4a



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REPLACEMENT SHEET

Figure 4b

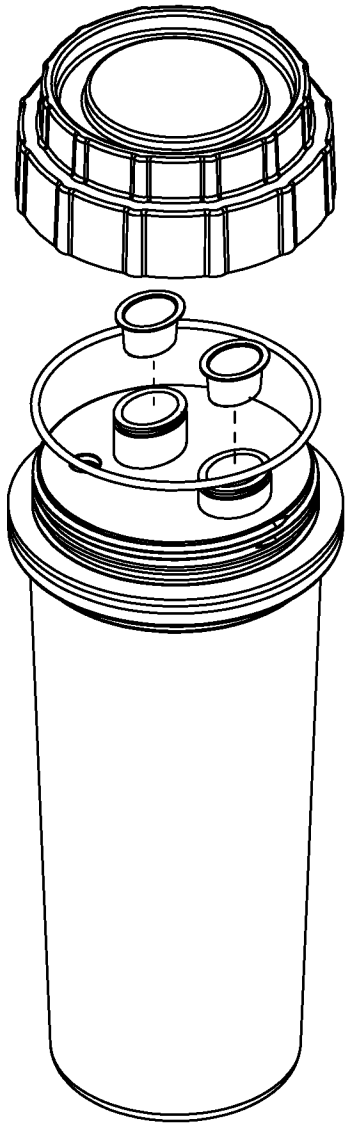

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Figure 5a

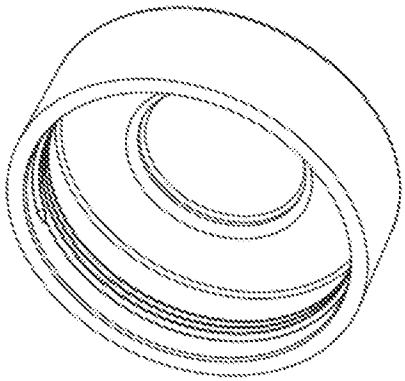
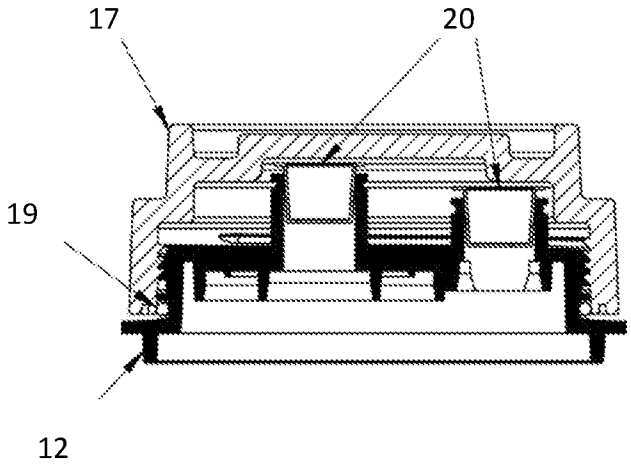


Figure 5b



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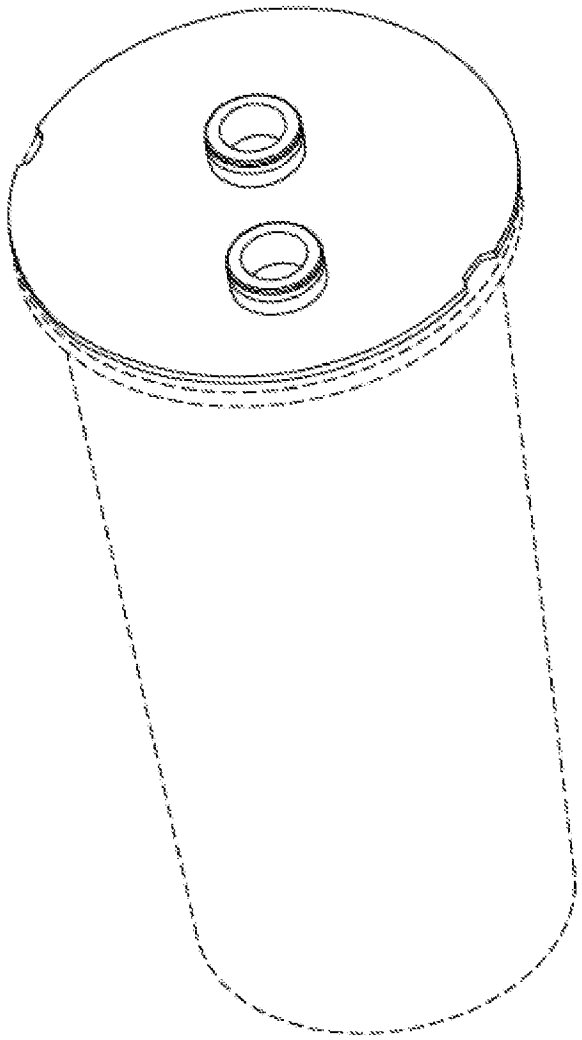

FIGURE 6A

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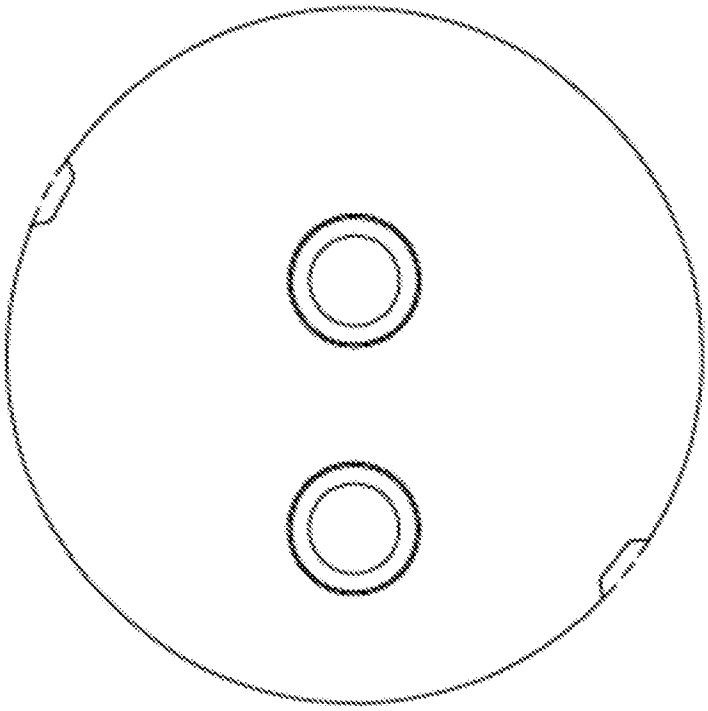

FIGURE 6B

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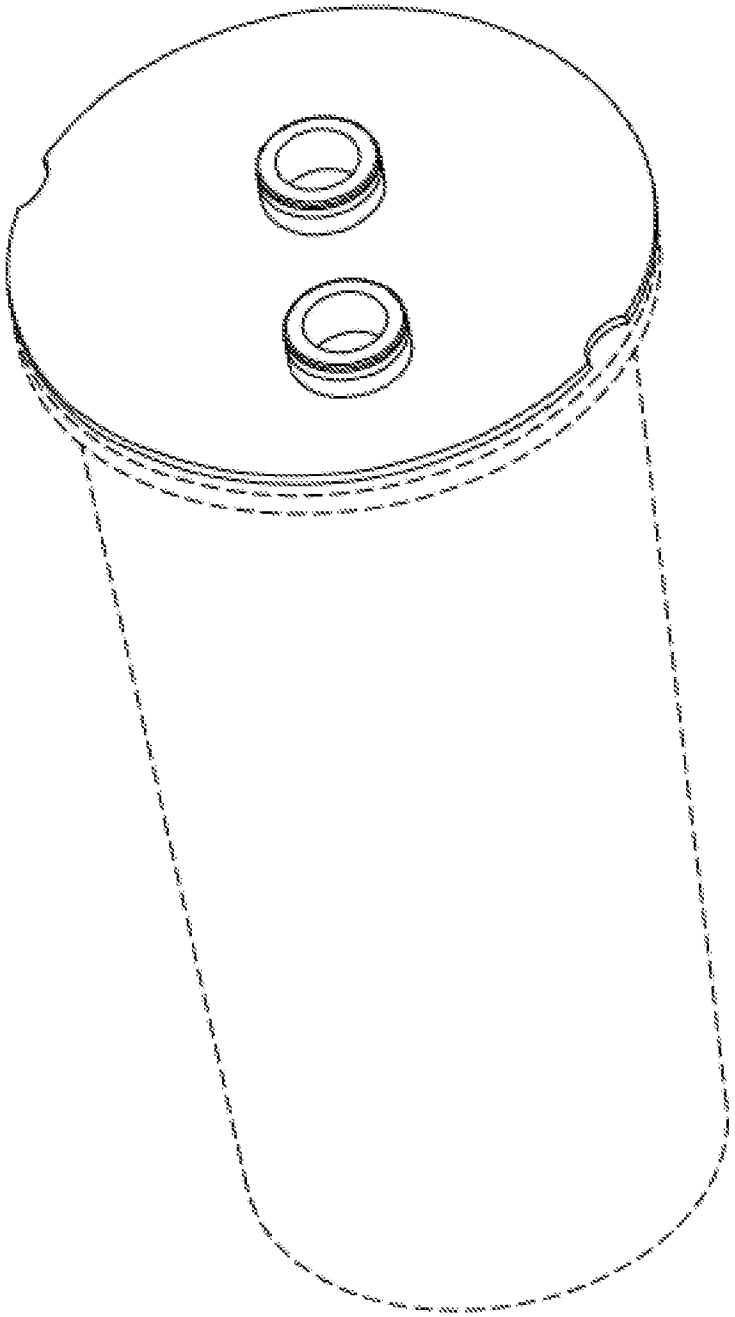

FIGURE 7A

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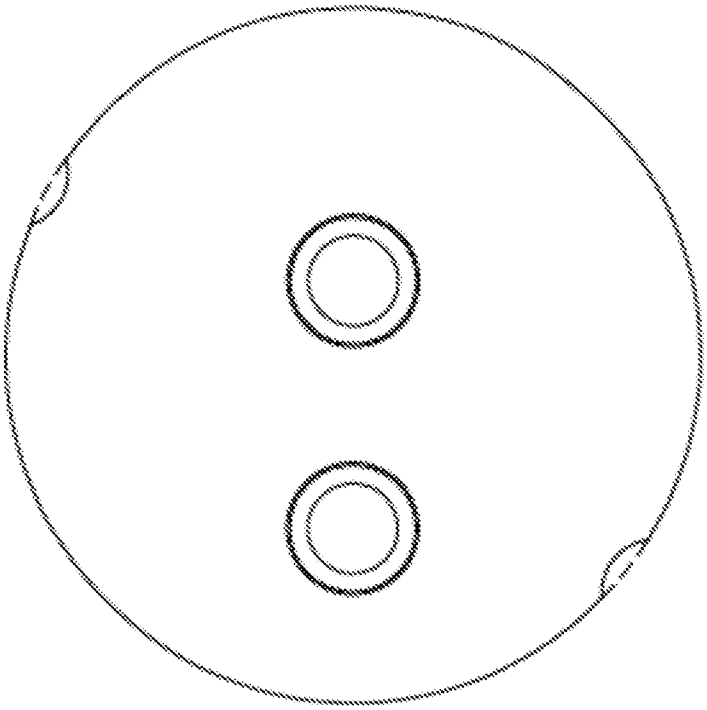

FIGURE 7B

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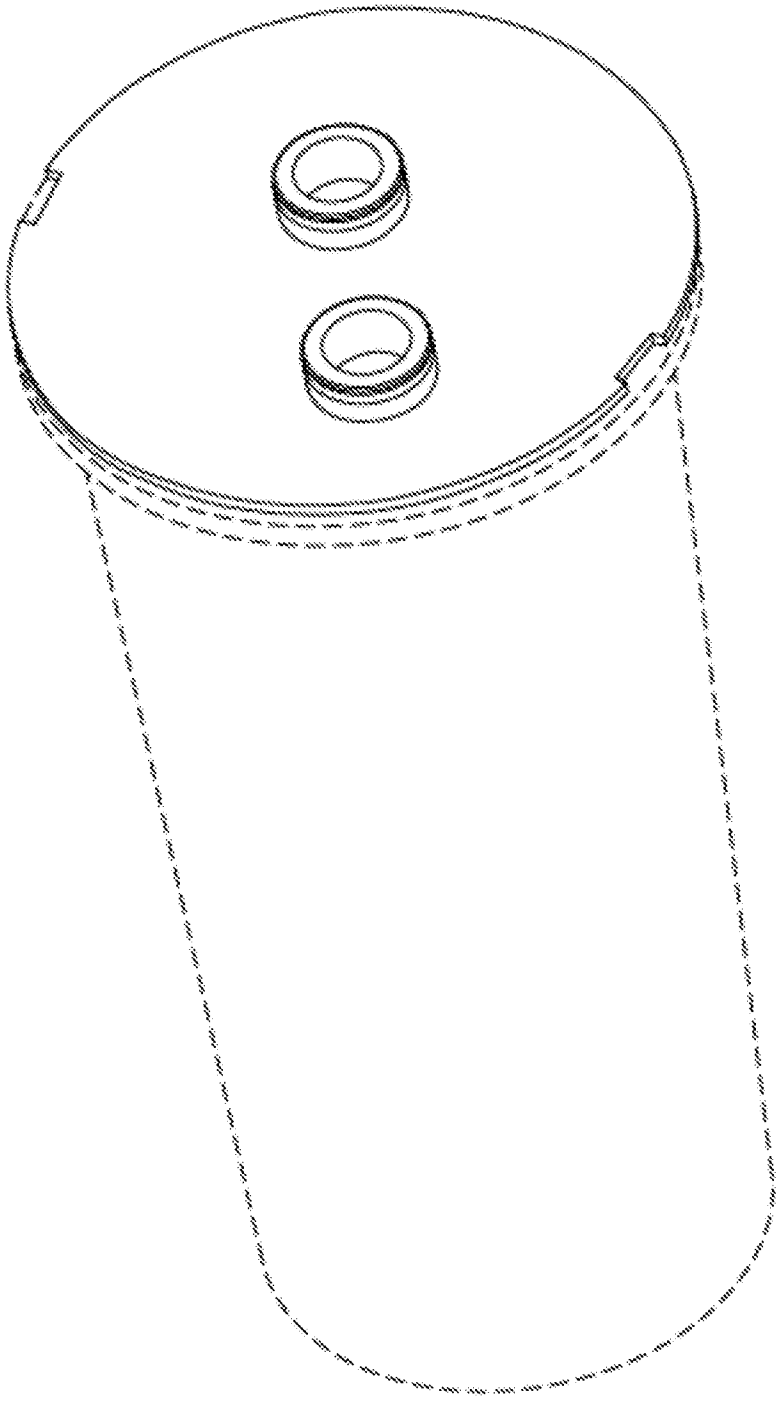

FIGURE 8A

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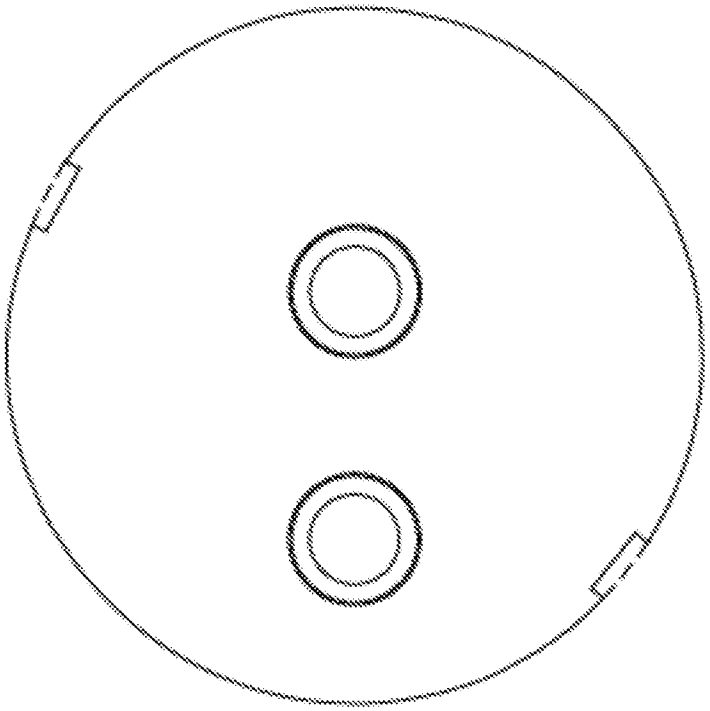

FIGURE 8B

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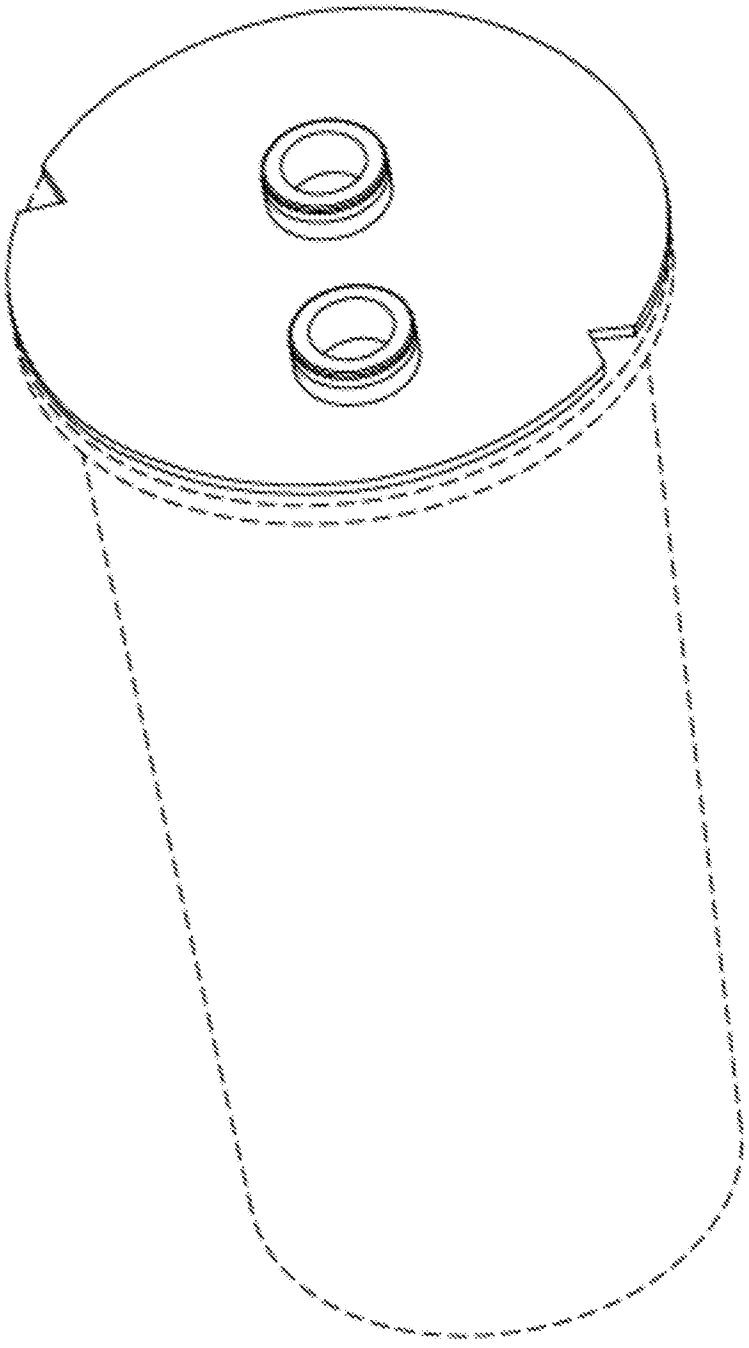

FIGURE 9A

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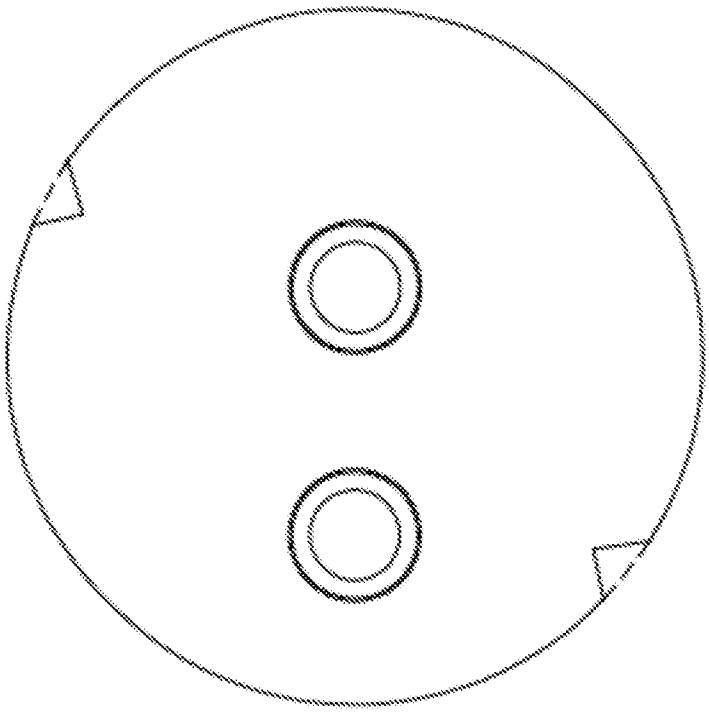

FIGURE 9B

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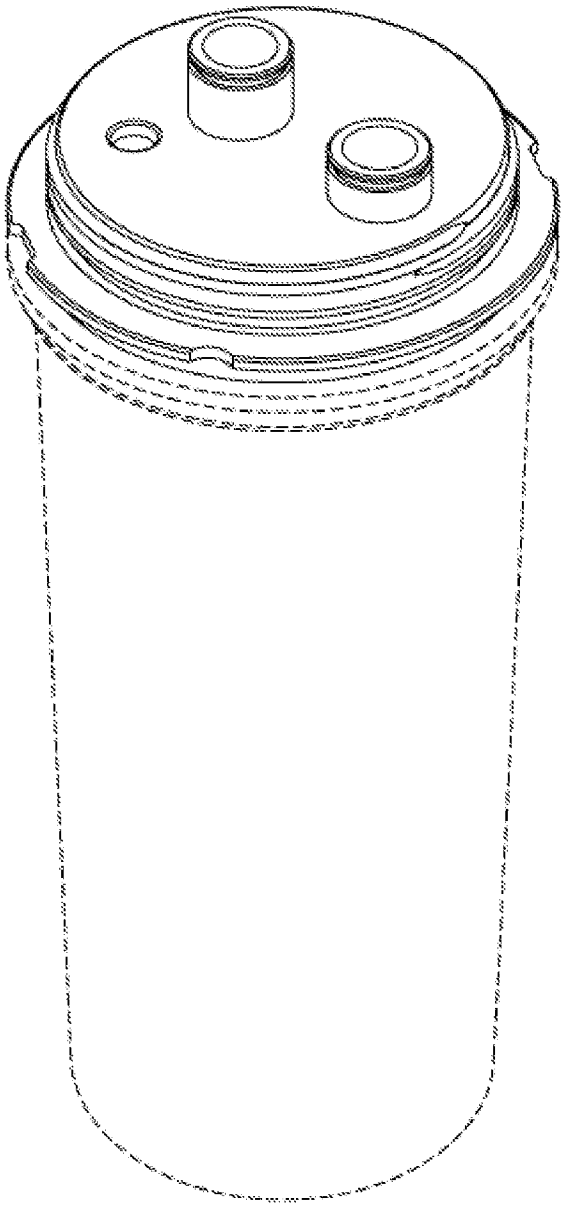

FIGURE 10A

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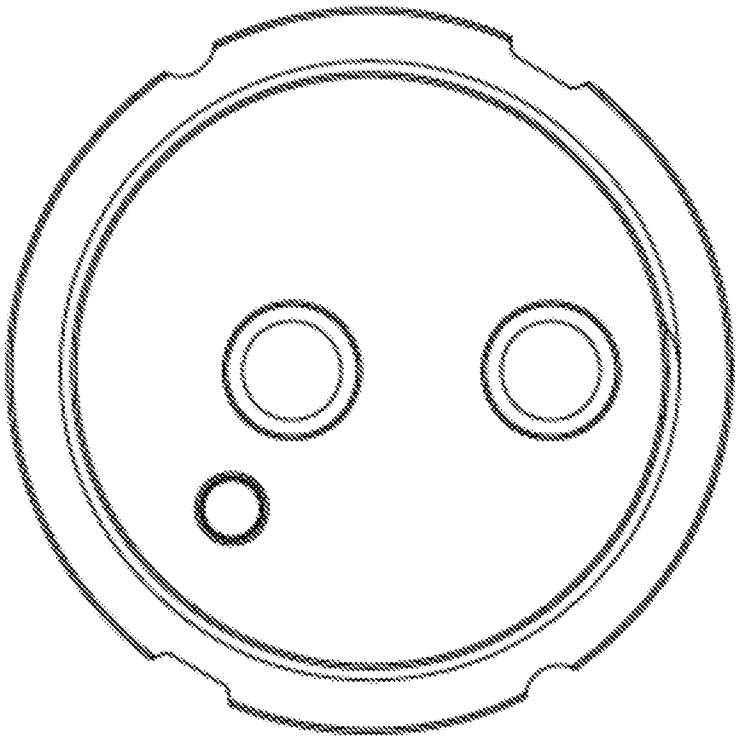

FIGURE 10B

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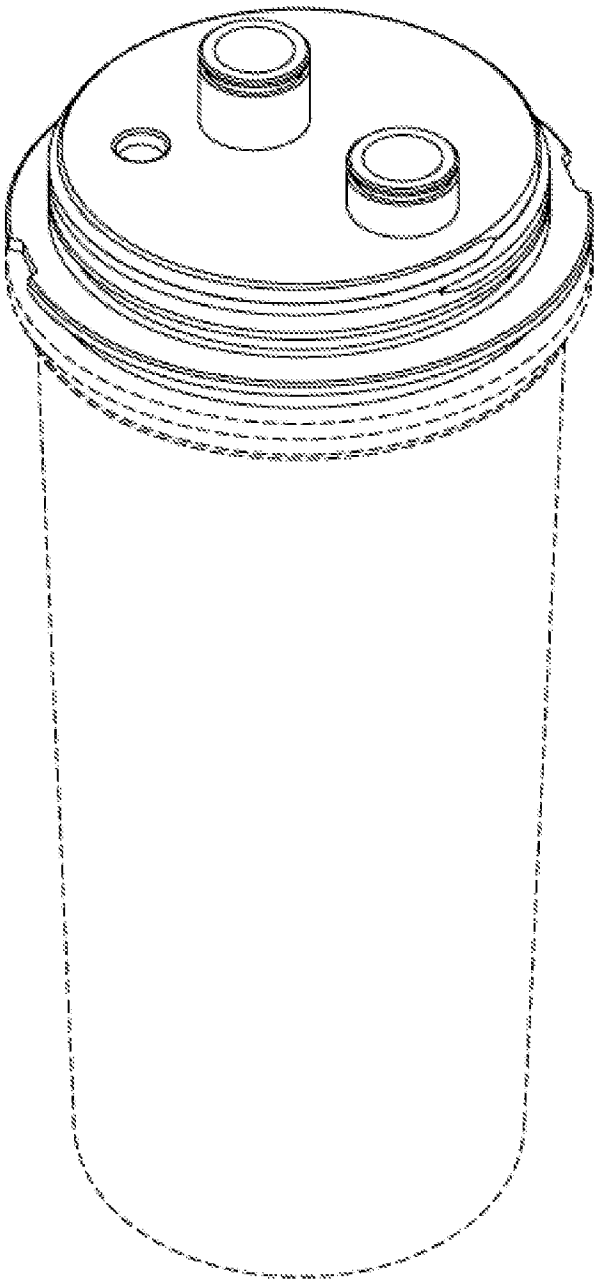

FIGURE 11A

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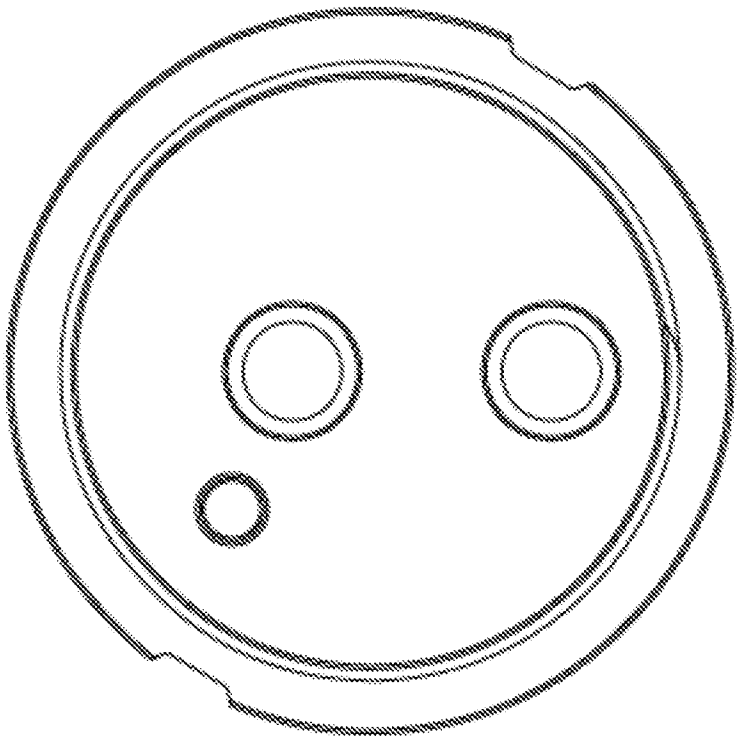

FIGURE 11B

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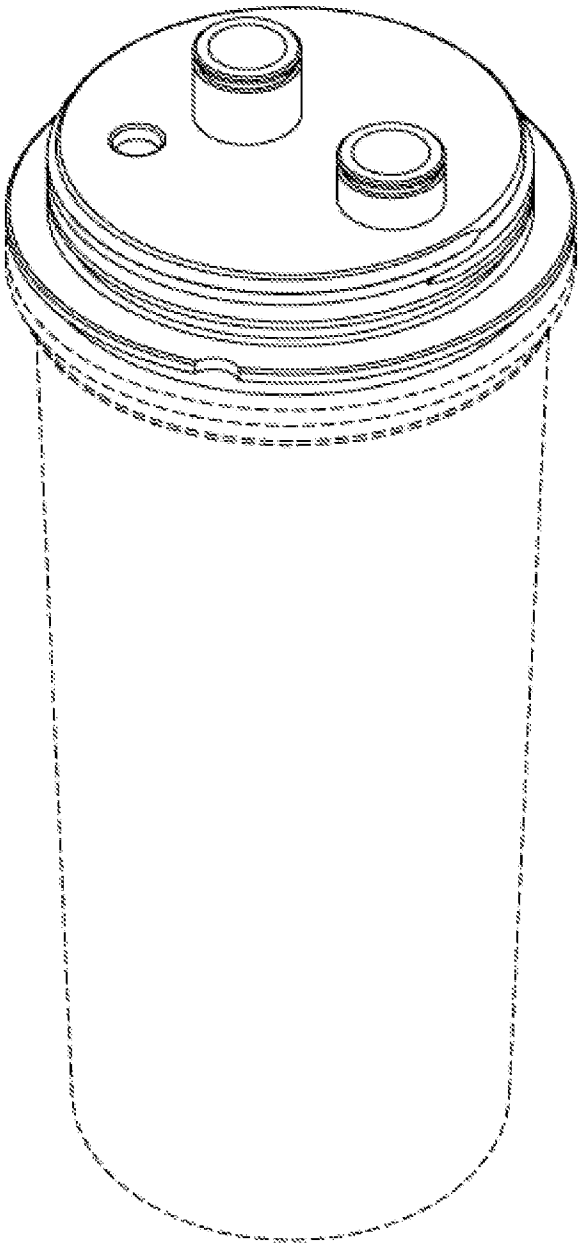

FIGURE 12A

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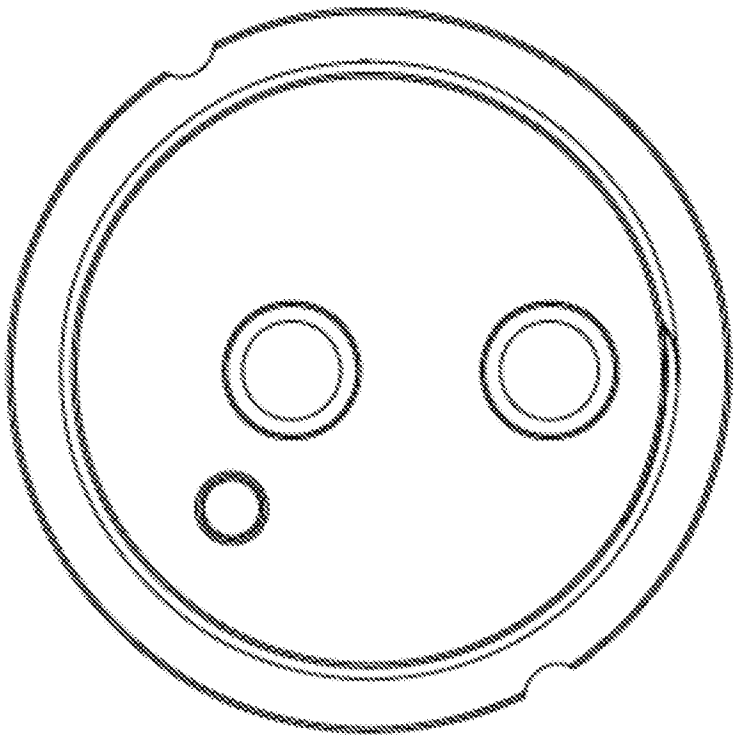

FIGURE 12B

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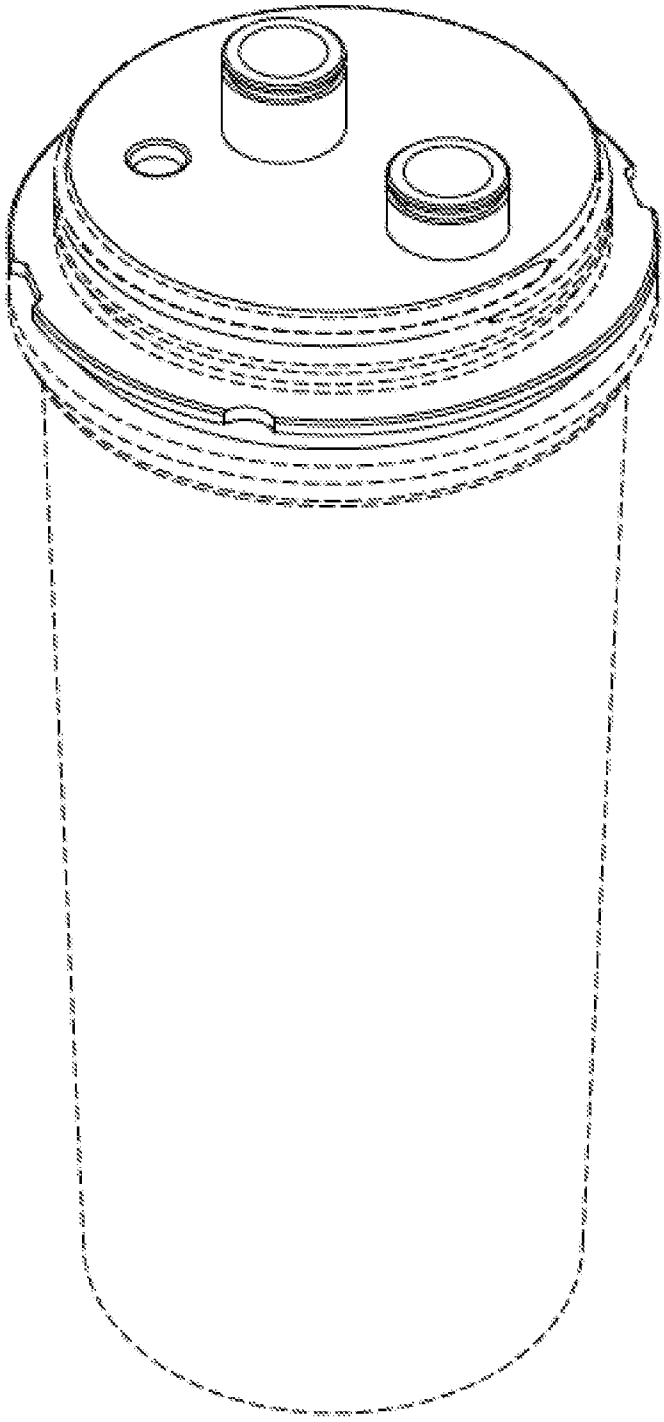

FIGURE 13A

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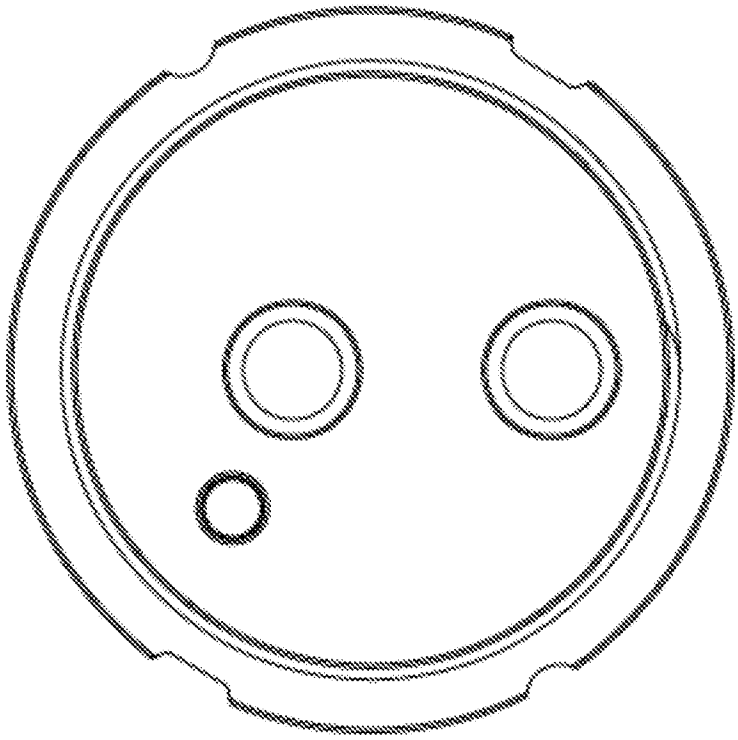

FIGURE 13B

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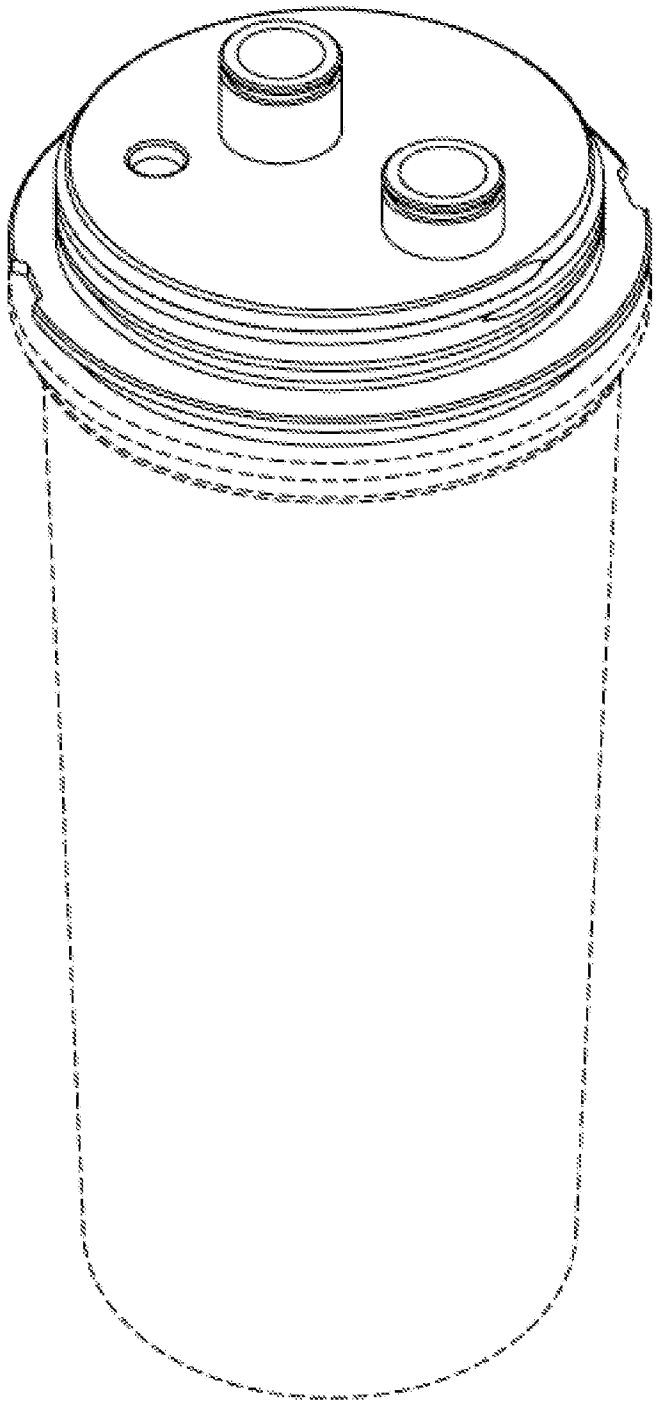

FIGURE 14A

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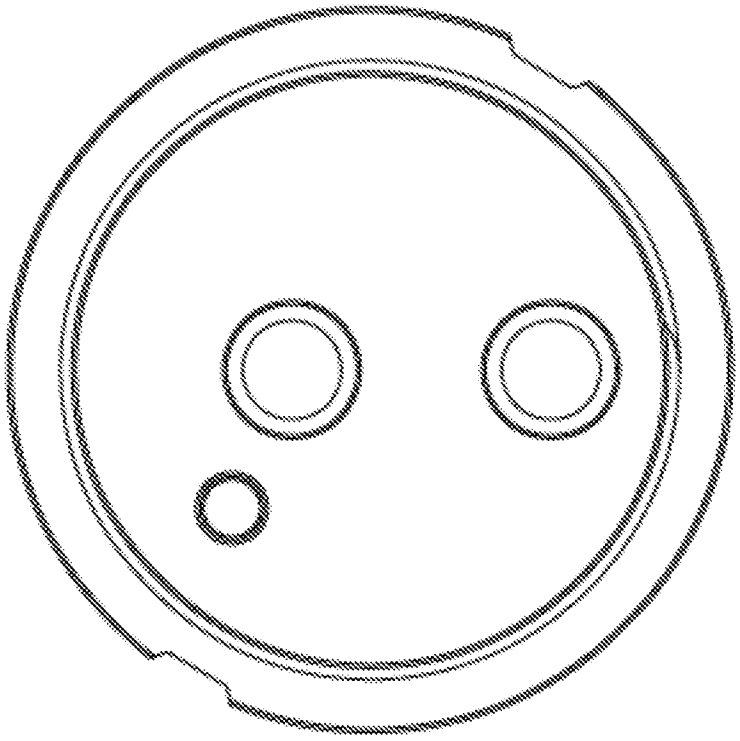

FIGURE 14B

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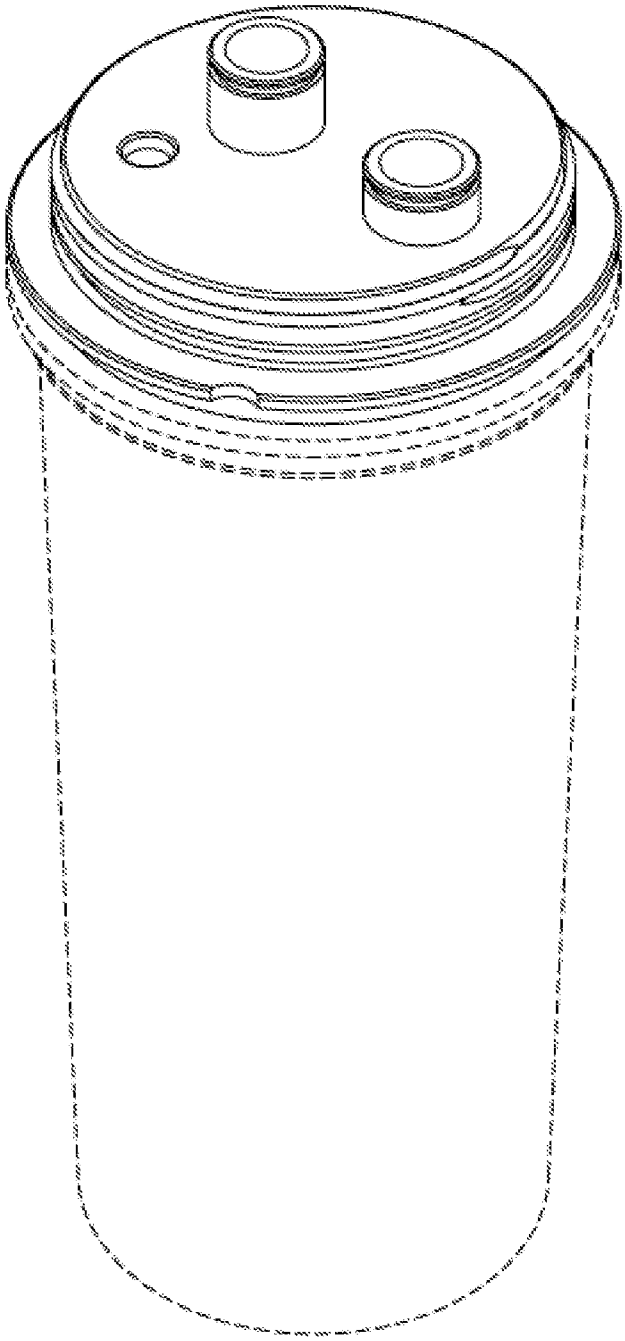

FIGURE 15A

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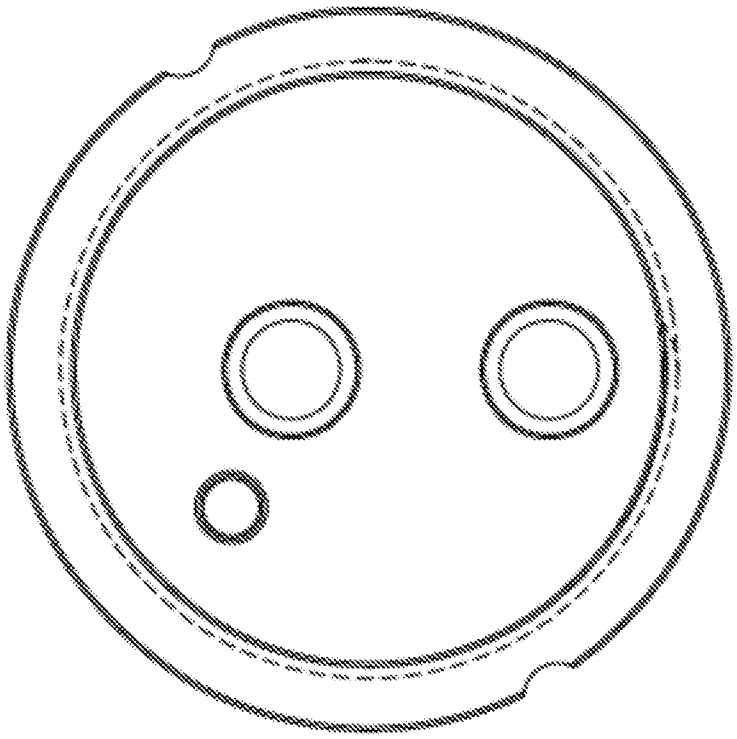

FIGURE 15B

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PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	15730828
Filing Date	2017-10-12
First Named Inventor	Mozzicato
Art Unit	3732
Examiner Name	LUCCHESI
Attorney Docket Number	SMTX-001-US

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	6592769		2003-07-15	Erickson	
	2	6409803		2002-06-25	Tremel	
	3	6592754		2003-07-15	Chilibeck	
	4	6692636		2004-02-17	Chilibeck	
	5	7306460		2007-12-11	Hubner	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15730828
	Filing Date	2017-10-12
	First Named Inventor	Mozzicato
	Art Unit	3732
	Examiner Name	LUCCHESI
	Attorney Docket Number	SMTX-001-US

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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
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See attached certification statement.

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

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Signature	/Steven R. Lazar/	Date (YYYY-MM-DD)	2018-09-27
Name/Print	Steven R. Lazar	Registration Number	32,618

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(11) EP 1 366 728 B1

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(54) **Surgical draining apparatus, in particular for a dental surgery**

Chirurgische Entleerungsvorrichtung, insbesondere für eine Zahnartzpraxis

Dispositif de vidage chirurgical, en particulier pour un cabinet dentaire

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Description

[0001] This invention relates to a surgical suction unit designed in particular, but not solely, for use in dental surgeries, which said unit comprises a liquid-ring suction pump associated with a liquid recirculation unit, the latter unit being fitted with a heat exchanger designed to cool the liquid returned into circulation, systems for collection of heavy metal amalgam particles, and a tank designed to collect liquids for recirculation in the pump.

[0002] The unit according to the invention combines the advantages of known liquid-ring systems (high negative pressure values achievable, ability to discharge aspirated fluids continuously), but is not subject to their limitations, especially high water consumption.

[0003] Units designed to aspirate and remove "surgical" fluids and liquids are used in numerous medical applications, and in particular in dental surgeries.

[0004] Units in which a suction pump is connected via pipes to cannulae or other suction devices used at the point of operation are known for this purpose.

[0005] The known systems are substantially divided into three main categories: liquid-ring units, air-ring units and wet-ring units.

[0006] "Liquid-ring" systems involve the use of a centrifugal pump with an impeller immersed in a ring of liquid. An air/liquid separator is located at the pump outlet.

[0007] A unit of this kind is described, for example, in German patent DE 3101954.

[0008] Liquid-ring units offer the advantage that a high negative pressure value can be achieved by the pump which, by creating a high suction speed in the suction cannulae, keeps the operating area and all conveyor pipes clean, even in the presence of large spillages.

[0009] Another advantage is their ability to discharge the aspirated fluids continuously, said fluids being discharged non-stop at positive pressure into the air/liquid separator.

[0010] However, liquid-ring units present the drawback of requiring very high water consumption to maintain the liquid ring around the impeller, and this problem is liable to become increasingly serious in future.

[0011] "Air-ring" systems, which have represented the alternative to the liquid-ring system for decades, comprise a centrifugal air-ring pump to generate the vacuum, and an air/liquid separator installed between the suction points in the operating area and the pump.

[0012] The separator, which operates in the part of the circuit in negative pressure, accumulates the aspirated fluids up to a maximum capacity level, after which it must be discharged, and the pump has to be shut down.

[0013] The system consequently presents the considerable drawback of noncontinuous operation, as well as slow air suction, which constitutes an intrinsic limitation of air-ring pumps.

[0014] A further limitation is the need for regular maintenance of the separator vessel, which requires frequent manual cleaning, with the risk of microbiological contamination of the operators.

[0015] The "wet-ring" system, which constitutes a development on air-ring devices, involves the use of a centrifugal air-ring pump combined with a motor-driven centrifugal separator of the liquids conveyed by the current.

[0016] The "wet-ring" system involves the use of a centrifugal air-ring pump combined with a motor-driven centrifugal separator which separates the liquids conveyed by the vacuum current and the solid particles of amalgam, consisting of heavy metals such as mercury, tin, silver, copper, zinc, palladium, indium, etc..

[0017] Some of these units include separate motors for the pump and the liquid and amalgam separator, involving increased costs, energy consumption, size and noise levels.

[0018] In other cases, a single motor is installed.

[0019] However, the problem of low head of air-ring pumps still remains in this version; this means a low transport speed of the fluids in the pipes, stagnation and undrained deposits in the ducts, which requires the suction unit to be over-dimensioned and makes it more complicated to manufacture the vacuum pipes. Moreover, considerable infiltrations of moisture take place, especially in the parts constituting the air-ring pump, leading to problems of condensation, microbiological pollution and chemical aggression in a part of the unit which cannot be washed or sanitised unless it is dismantled.

[0020] A liquid-ring system has also been proposed wherein the pump is connected to a tank which separates the air from the circulating fluids by means of a pipe that recirculates the accumulated liquid.

[0021] However, this system presents the drawback of overheating the liquid, which is continually recirculated by the pump until it reaches such a temperature as to considerably reduce the performance of the pump and the entire system, thus forcing the designer to over-dimension all the components of the installation.

[0022] A further limitation of this system is that the amalgams are separated in decantation vessels located in the suction section upstream of the pump, and this system is unable to retain the smaller particles that travel at high speed, which are deposited in the liquid collection tank and conveyed from there to the outlet filter, which is thus often clogged, so that periodic maintenance of the system is required.

[0023] These drawbacks and limitations are overcome by a surgical suction unit according to the characterising part of the annexed claims.

[0024] The invention will now be described in detail, by way of example but not of limitation, by reference to the annexed figures, wherein:

- figure 1 is a simplified diagram of the suction unit according to the invention;
- figure 2 shows separation devices located at the pump outlet, in cross-section;
- figure 2a shows a variation on the devices illustrated in figure 2;

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- figures 3a to 3d schematically illustrate different embodiments of the devices which input the fluids into the pump;
- figure 4 is a view of a unit according to the invention.

[0025] The apparatus according to the invention (see figure 1) substantially consists of three units: an input unit shown as 1, a liquid-ring pump 2 which circulates the fluids, and a unit indicated as 3, which separates the amalgams and liquids from the air.

[0026] The separation unit also comprises a liquid collection tank 4, connected to pump inlet 7 via a pipe 5, to which a heat exchanger 6 is fitted.

[0027] The surgical fluids, air and liquids from the various uses are conveyed from there, through pipes 8, to input unit 1, then to pump 2, and from there to separation unit 3.

[0028] The liquids are then recirculated after suitable cooling, and the surplus is discharged through outlet pipe 9.

[0029] Input unit 1 and separator unit 3 will now be described in more detail.

[0030] Input unit 1 (see figure 3a) comprises a connector 10 connected to pipes which lead to the various points of use, a filter 11 designed to separate the coarser solid parts, and a pipe 12 downstream of the filter, which leads to pump inlet 7.

[0031] Pipe 12 is connected to a well 14 for input of environmental air. Well 14 also leads to a pipe 15 connected to the water network, to which a solenoid valve 16 or the like is fitted, allowing a certain quantity of top-up water to be introduced into the well when necessary if the unit is emptied for maintenance purposes. This solution creates a physical separation between the water network and the device, in order to eliminate all risk of bacterial contamination of the water network.

[0032] A valve of known type 13 is fitted to the connector that leads from well 14 to pump inlet pipe 12, enabling the vacuum in suction pipes 10 leading to the point of use to be regulated.

[0033] Separator unit 3, illustrated in detail in figure 2, is installed downstream of the pump.

[0034] Number 19 indicates the pipe leading from the outlet of pump 2, from which water mixed with air and the particles aspirated at the various points of use arrives.

[0035] Pipe 19 leads to a separator device 20 consisting, for example, of a cyclone or other similar device of known type in which the heavier parts, especially amalgams, are separated after a reduction in the speed of the fluids conveyed from the pump; said parts then drop downwards and are collected on the bottom of a removable tank 21, located below cyclone 20. When tank 21 is full, the accumulated liquids spill over the overfall that separates it from the next tank 25 and flow into that tank, while the heavier parts are deposited on the bottom of tank 21. The air and the lighter parts exit from the upper part of the cyclone, guided by a shaped partition or wall 22, and are conveyed to a second separator shown as 23. This separator is constituted by a set of concentric tubular elements 24 that force the air to perform a series of sudden reversals of the direction of motion, as shown by the arrows in figure 2. These sudden reversals of motion aid the separation of the liquids into aerosols, which collect in a second tank 25, also removable, located under separator 23.

[0036] The air exits from separator 23 through an outlet pipe 26 leading to the exterior; a bacterial filter 27 can be fitted to said pipe if the air is to be recirculated into the premises.

[0037] The filter is shown in figure 2a, which illustrates a separator complex similar to the previous one but fitted with said filter.

[0038] Tank 25, in which liquids from which the solid particles have been almost entirely removed collect, is fitted with an overfall 28 from which the liquid in the upper part of the tank is conveyed to an outlet pipe 29. Sensors 50 of known type detect the level of the solid parts in tank 21 and of the liquids in tanks 21 and 25.

[0039] Recirculation pipe 5, leading to the pump inlet, is connected to a connection 30 in the bottom of tank 25.

[0040] The system operates as follows.

[0041] When pump 2 is switched on, a strong negative pressure is created in pipe 12, as a result of which air is aspirated through pipes 10 leading to the points of use, which said air draws surgical liquids and the various solid particles with it.

[0042] This mixture of fluids and solids is conveyed to the pump, from which it is conveyed to the set of separation units 3.

[0043] By suitably regulating valve 13, suction pipe 12 leading to pump inlet 7 can be placed in communication with well 14 through which environmental air is aspirated, thus allowing the vacuum created by suction in pipes 10 to be regulated as required.

[0044] The necessary amount of water can be introduced into the well when the liquids in the unit need to be topped up; said water flows down into the well and is also aspirated by the pump.

[0045] The configuration illustrated allows physical separation between the water network and the unit, so as to eliminate all risk of countercurrent bacterial migration and prevent contamination of said network.

[0046] Alternatively, as shown in figures 3b, 3c and 3d, a tank of sanitising liquid 6 could be connected to pipe 12 and the pump inlet.

[0047] Sanitising liquid tank 6 can be screwed directly to the body of input unit 1 as illustrated in figure 3b, or may be constituted by a separate can which is always connected to the input unit via suitable pipes fitted with valve devices of known type as illustrated in figure 3d; alternatively, it can be conveyed to the point of input of water from the network, as illustrated in figure 3c.

[0048] In the last two cases a filter, shown as no. 40, can be fitted to the inlet of environmental air suction well 14.

[0049] The fluids and solid particles aspirated by the

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pump are then expelled under positive pressure and conveyed to separator unit 3, through pipe 19 (fig. 2).

[0050] Here, the fluids enter cyclone 20, in which their flow rate suddenly slows; the heavier solid parts, especially amalgams of heavy metals, then spill downwards and collect on the bottom of removable tank 21.

[0051] Alternatively, a motor-driven cyclone of known type could be installed instead of cyclone 20; in this case the complex will be configured differently.

[0052] The air, with part of the nebulised liquids, is deviated by wall 22, and conveyed to separator device 23. Here, the abrupt reversals of the direction of motion and variations in speed undergone by the fluid current in order to pass into the cavity between the various tubular elements 24 leads to detachment of the residues, which fall to the bottom and collect in collection tank 25.

[0053] The air, free of liquids and solid particles, can then be conveyed to the exterior through pipe 26, or returned into the premises after being passed through filter 27.

[0054] The liquids arriving from the overfall of tank 21, with the finer solid particles, collect in tank 25, where they are drawn through connector 30 and conveyed along recirculation pipe 5.

[0055] Next, the liquids are cooled in heat exchanger 6, sent back to the inlet of the pump 7, and returned into circulation.

[0056] Any surplus liquid spills over overfall 28 and can be discharged along pipe 29.

[0057] The system described offers numerous advantages compared with the currently known systems.

[0058] The use of a liquid-ring pump as vacuum generator allows high vacuum values to be obtained, with a suitable transport speed of the fluids aspirated through the suction pipes leading from the cannulae; it ensures that all the aspirated fluids pass through the pump, with the advantage of safe transport through a single pipe which can be washed and sanitised without being dismantled, while the discharge of liquids under positive pressure downstream of the pump facilitates their separation and discharge. The characteristics of the input unit ensure effective protection of the water network against contamination because either there is no connection between the two circuits, so transmigration of pollutant microbial colonies in countercurrent is impossible, or the sanitising liquid keeps the pressurised running water input connection sterile.

[0059] The fact that liquids are recovered and recirculated after separation aids aggregation of the microparticles not removed during earlier stages and the formation of larger, heavier precipitates which escape the Brownian motion of suspensions, and are deposited sooner or later in collection tank 21.

[0060] The fact that a heat exchanger cools the liquid returned into circulation maintains constant pump efficiency, and prevents the formation of internal scaling due to precipitation of the salts in the circulating liquids.

[0061] Improvements in the most significant aspects of sanitary applications are thus achieved at the same time, namely:

- no water consumption for continuous operation;
- a high level of hygiene without maintenance;
- recovery of heavy metals;
- high performance and constant efficiency in continuous service;
- energy saving;
- low noise levels;
- a highly reliable system which is simple to manufacture.

[0062] An expert in the field could devise various modifications and variations, all of which should be deemed to fall within the ambit of this invention.

Claims

1. Surgical suction unit for dental surgeries, **characterised in that** it includes:

   • a liquid-ring suction pump (2);
   • an input unit (1), upstream of said pump (2), connectable to the various points of use;
   • a separator unit (3), downstream of said pump (2), which said separator unit comprises first means (20) designed to separate the solid and liquid particles from the fluids received from the pump, and second means (23) designed to separate the remaining liquids from the air;
   • a first tank (21) designed to collect said solid and liquid parts;
   • a second tank (25) designed to collect said liquids; and
   • means (5) designed to place said second tank in communication with the pump inlet.

2. Surgical suction unit as claimed in claim 1, **characterised in that** an overfall is created between said first and second tanks (21, 25) which allows the liquid present in said first tank to flow into the adjacent tank.

3. Surgical suction unit as claimed in claim 2, **characterised in that** means (6) are installed along the route (5) that connects said liquid and particle collection tank (25) with the inlet of pump (2) to cool said liquid.

4. Surgical suction unit as claimed in claim 1, **characterised in that** said separation means (3) comprise first devices (20) designed to separate the solids and liquids from the air flow and second devices (23) designed to separate the liquids into aerosols, which said first and second devices are arranged in series.

5. Surgical suction unit as claimed in claim 4, **charac-**

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terised in that said separator (23) which separates the liquids in aerosol form from the expelled air comprises a plurality of concentric pipes (24) with different cross-sectional shapes, designed to impose abrupt reversals and variations of motion on the air flow for the purpose of recovering the condensed liquids.

6. Surgical suction unit as claimed in claim 4 or 5, **characterised in that** it includes tanks (21, 25) for collection of the solids and liquids associated with said first and second separation devices (20, 23) respectively, which said tanks are connected by an overfall.

7. Surgical suction unit as claimed in each of the preceding claims, **characterised in that** it includes an inlet unit (1) for the fluids aspirated by the pump, which is fitted with a well (14) communicating with pipe (12) that conveys the aspirated fluids to the pump, means (15, 16) designed to pour water from the water network into said well being fitted.

8. Surgical suction unit as claimed in claim 7, **characterised in that** it includes adjustable valve means (13) designed to place said well (14) in communication with said aspirated fluid supply pipe (12) to regulate the degree of vacuum in the pipes.

9. Surgical suction unit as claimed in each of the preceding claims, **characterised in that** it includes a tank of sanitising liquid (6) connected to the inlet pipe leading to pump (2).

10. Surgical suction unit as claimed in each of the preceding claims, **characterised in that** it includes, at the outlet of said pump (2), means (20) designed to slow the speed of the fluids conveyed by the pump to allow separation of the liquids and heavy parts, and means (23), downstream of the preceding ones, designed to separate the liquids in aerosol form from the airflow, each of which separator means is associated with the corresponding collection tank (21, 25), which said tanks are arranged in series and connected by an overfall, a pipe (5) designed to draw liquid from the bottom of said second tank (25) and convey it to the inlet of pump (2) being fitted.

11. Surgical suction unit as claimed in claim 9, **characterised in that** means (6) designed to cool the liquid conveyed to pump (2) are fitted on said pipe (5).

12. Surgical suction unit as claimed in claim 10, **characterised in that** said tanks (21, 25) are removable.

13. Surgical suction unit as claimed in claim 11, **characterised in that** it includes level gauges (50) for the solid parts in tank (21) and the liquids in tank (25).

Patentansprüche

1. Chirurgisches Absauggerät für Zahnarztpraxen, **gekennzeichnet durch** die Tatsache, dass Folgendes vorgesehen ist:

   • eine Absaugpumpe (2) des Typs eines flüssigen Rings;
   • eine Eingangssperre (1) vor besagter Pumpe (2), anschließbar an den verschiedenen Verwendungspunkten;
   • eine Trenngruppe (3) nach besagter Pumpe (2), wobei besagte Trenngruppe erste Mittel (20) besitzt, die geeignet sind, die festen und flüssigen Teilchen aus den von der Pumpe kommenden Flüssigkeiten abzuscheiden, und zweite Mittel (23), die geeignet sind, die verbleibende Flüssigkeit aus der Luft auszuscheiden;
   • ein erster Auffangbehälter (21) für besagte feste und flüssige Teilchen;
   • ein zweiter Auffangbehälter (25) für die besagte Flüssigkeit; und
   • Mittel (5), die geeignet sind, den besagten zweiten Behälter mit dem Pumpeneingang in Verbindung zu bringen.

2. Chirurgisches Absauggerät gemäß Anspruch 1, charakterisiert durch die Tatsache, dass ein Überlaufwehr zwischen besagtem ersten und zweiten Behälter (21, 25) vorgesehen ist, das geeignet ist, der im ersten Behälter vorhandenen Flüssigkeit zu erlauben, in den benachbarten Behälter zu gelangen.

3. Chirurgisches Absauggerät gemäß Anspruch 2, charakterisiert durch die Tatsache, dass Mittel (6) vorgesehen sind längs der Strecke (5), die den besagten Auffangbehälter (25) für die Flüssigkeiten und die Teilchen mit dem Eingang der Pumpe (2) verbindet, die geeignet sind, besagte Flüssigkeit abzukühlen.

4. Chirurgisches Absauggerät gemäß Anspruch 1, charakterisiert durch die Tatsache, dass besagte Trennmittel (3) erste Vorrichtungen (20) umfassen, die geeignet sind, die festen und die flüssigen Teilchen vom Luftfluss zu trennen, und ferner zweite Vorrichtungen (23), die geeignet sind, die Flüssigkeiten in Aerosol auszuscheiden, wobei besagte erste und zweite Vorrichtungen sind in Serien ausgelegt sind.

5. Chirurgisches Absauggerät gemäß Anspruch 4, charakterisiert durch die Tatsache, dass besagter Ausscheider (23) der Flüssigkeiten aus der ausgestoßenen Luft in Aerosol eine Mehrzahl von konzentrischen Schläuchen (24) mit verschiedenen Durchmessern umfasst, die geeignet sind, für die Rückgewinnung der kondensierten Flüssigkeiten dem Luft-

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fluss plötzliche Umkehrungen und Variationen aufzuzwingen.

6. Chirurgisches Absauggerät gemäß Anspruch 4 oder 5, charakterisiert durch die Tatsache, dass Auffangbehälter (21, 25) für die festen und die flüssigen Teilchen vorgesehen sind, die jeweils mit besagten ersten und zweiten Trennvorrichtungen (20, 23) in Verbindung stehen, da die Behälter durch ein Überlaufwehr verbunden sind.

7. Chirurgisches Absauggerät gemäß jedem der vorhergehenden Ansprüche, charakterisiert durch die Tatsache, dass eine Eingangssperre

(1) für die von der Pumpe abgesaugten Flüssigkeiten vorgesehen ist, die eine Auffanggrube (14) vorsieht, die mit der Zuführleitung (12) zur Pumpe der angesaugten Flüssigkeiten in Verbindung steht, denn es sind Mittel (15, 16) vorgesehen, die geeignet sind, Wasser aus dem Wassernetz in besagte Auffanggrube einzubringen.

8. Chirurgisches Absauggerät gemäß Anspruch 7, charakterisiert durch die Tatsache, dass regulierbare Ventile (13) vorgesehen sind, die geeignet sind, besagte Auffanggrube (14) mit besagter Zuführleitung (12) der angesaugten Flüssigkeiten in Verbindung zu setzen, um die Vakuummenge in den Leitungen zu regulieren.

9. Chirurgisches Absauggerät gemäß jedem der vorhergehenden Ansprüche, charakterisiert durch die Tatsache, dass ein Behälter mit Desinfektionsflüssigkeit (6) vorgesehen ist, der mit der Eingangsleitung zur Pumpe verbunden ist (2).

10. Chirurgisches Absauggerät gemäß jedem der vorhergehenden Ansprüche, charakterisiert durch die Tatsache, dass am Ausgang besagter Pumpe (2) Mittel (20) vorgesehen sind, die geeignet sind, die Geschwindigkeit der aus der Pumpe kommenden Flüssigkeit zu verlangsamen, um die Trennung der Flüssigkeiten und der schweren Teilchen zu erlauben, und ferner Mittel (23) vor den vorherigen, die geeignet sind, die Flüssigkeiten aus dem Luftfluss in Aerosol abzuscheiden, denn jedes der besagten Mittel ist mit einem entsprechenden Auffangbehälter (21, 25) assoziiert, wobei besagte Behälter in einer Reihe angebracht und an ein Überlaufwehr angeschlossen sind und wobei eine Leitung (5) vorgesehen ist, die geeignet ist, Flüssigkeit vom Boden des besagten zweiten Behälters (25) zu entnehmen und zum Eingang der Pumpe (2) zu leiten.

11. Chirurgisches Absauggerät gemäß Anspruch 9, charakterisiert durch die Tatsache, dass auf besagter Leitung (5) Mittel (6) vorgesehen sind, die geeignet sind, die zur Pumpe (2) geleitete Flüssigkeit abzukühlen.

12. Chirurgisches Absauggerät gemäß Anspruch 10, charakterisiert durch die Tatsache, dass besagte Behälter (21, 25) entfernbar sind.

13. Chirurgisches Absauggerät gemäß Anspruch 11, charakterisiert durch die Tatsache, dass Niveauanzeiger (50) für die festen Teile im Behälter (21) und für die Flüssigkeiten im Behälter (25) vorgesehen sind.

Revendications

1. Appareil d'aspiration chirurgical pour cabinets dentaires, **caractérisé par le fait qu'**il prévoit :

- une pompe d'aspiration (2) du type à anneau liquide;
- un bloc d'entrée (1), en amont de ladite pompe (2), pouvant être relié à différents points d'utilisation;
- un groupe séparateur (3), en aval de ladite pompe (2), ledit groupe séparateur comprenant des premiers dispositifs (20) en mesure de séparer les particules solides et liquides des fluides provenant de la pompe et des seconds dispositifs (23) en mesure de séparer les liquides résiduels de l'air;
- un premier réservoir (21) contenant lesdites particules solides et liquides;
- un second réservoir (25) contenant lesdits liquides et
- les dispositifs permettant (5) de mettre en communication ledit second réservoir avec l'entrée de la pompe.

2. Appareil d'aspiration chirurgical selon la revendication n° 1, **caractérisé par le fait qu'**il prévoit un déversoir entre lesdits premier et second réservoir (21, 25) en mesure de permettre au liquide présent dans ledit premier réservoir de passer dans le réservoir adjacent.

3. Appareil d'aspiration chirurgical selon la revendication n° 2, **caractérisé par le fait qu'**il prévoit, le long du parcours (5) qui relie ledit réservoir (25) contenant des liquides et des particules avec l'entrée de la pompe (2), des dispositifs (6) en mesure de refroidir ledit liquide.

4. Appareil d'aspiration chirurgical selon la revendication n° 1, **caractérisé par le fait que** lesdits dispositifs de séparation (3) comprennent des premiers dispositifs (20) en mesure de séparer les solides et

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les liquides du flux d'air et des seconds dispositifs (23) en mesure de séparer les liquides en aérosol, lesdits premiers et seconds dispositifs étant disposés en série.

5. Appareil d'aspiration chirurgical selon la revendication n° 4, **caractérisé par le fait que** ledit séparateur (23) des liquides en aérosol de l'air expulsé comprend plusieurs tuyaux concentriques (24) de différentes sections, en mesure d'imposer de brusques inversions et variations du flux d'air pour la récupération des liquides condensés.

6. Appareil d'aspiration chirurgical selon les revendications n° 4 ou 5, **caractérisé par le fait qu'**il prévoit des réservoirs (21, 25) contenant des solides et des liquides respectivement associés auxdits premiers et seconds dispositifs de séparation (20, 23), lesdits réservoirs étant reliés par un déversoir.

7. Appareil d'aspiration chirurgical selon toutes les revendications précédentes, **caractérisé par le fait qu'**il prévoit un bloc (1) d'entrée des fluides aspirés par la pompe, qui présente un puisard (14) en communication avec le conduit (12) d'adduction à la pompe des fluides aspirés, sachant que sont prévus des dispositifs (15, 16) en mesure de verser de l'eau provenant du réseau d'alimentation dans ledit puisard.

8. Appareil d'aspiration chirurgical selon la revendication n° 7, **caractérisé par le fait qu'**il prévoit des dispositifs valvulaires réglables (13) en mesure de mettre en communication ledit puisard (14) avec ledit conduit (12) d'adduction des fluides aspirés de façon à régler le degré de vide dans les conduits.

9. Appareil d'aspiration chirurgical selon toutes les revendications précédentes, **caractérisé par le fait qu'**il prévoit un réservoir de liquide désinfectant (6) relié au conduit d'entrée de la pompe (2).

10. Appareil d'aspiration chirurgical selon toutes les revendications précédentes, **caractérisé par le fait qu'**il prévoit, à la sortie de ladite pompe (2) des dispositifs (20) en mesure de ralentir la vitesse des fluides en provenance de la pompe de façon à permettre la séparation des liquides et des particules plus lourdes, et des dispositifs (23) en aval des précédents, en mesure de séparer les liquides en aérosol du flux d'air, chacun desdits dispositifs séparateurs étant associé à un réservoir correspondant (21, 25), lesdits réservoirs étant disposés en série et reliés par un déversoir, sachant qu'il est prévu un conduit (5) en mesure de prélever le liquide dans le fond dudit second réservoir (25) et de le diriger vers l'entrée de la pompe (2).

11. Appareil d'aspiration chirurgical selon la revendication n° 9, **caractérisé par le fait qu'**il prévoit, sur ledit conduit (5), des dispositifs (6) en mesure de refroidir le liquide véhiculé vers la pompe (2).

12. Appareil d'aspiration chirurgical selon la revendication n° 10, **caractérisé par le fait que** lesdits réservoirs (21, 25) sont amovibles.

13. Appareil d'aspiration chirurgical selon la revendication n° 11, **caractérisé par le fait qu'**il prévoit des indicateurs de niveau (50) des particules solides présentes dans le réservoir (21) et des liquides présents dans le réservoir (25).

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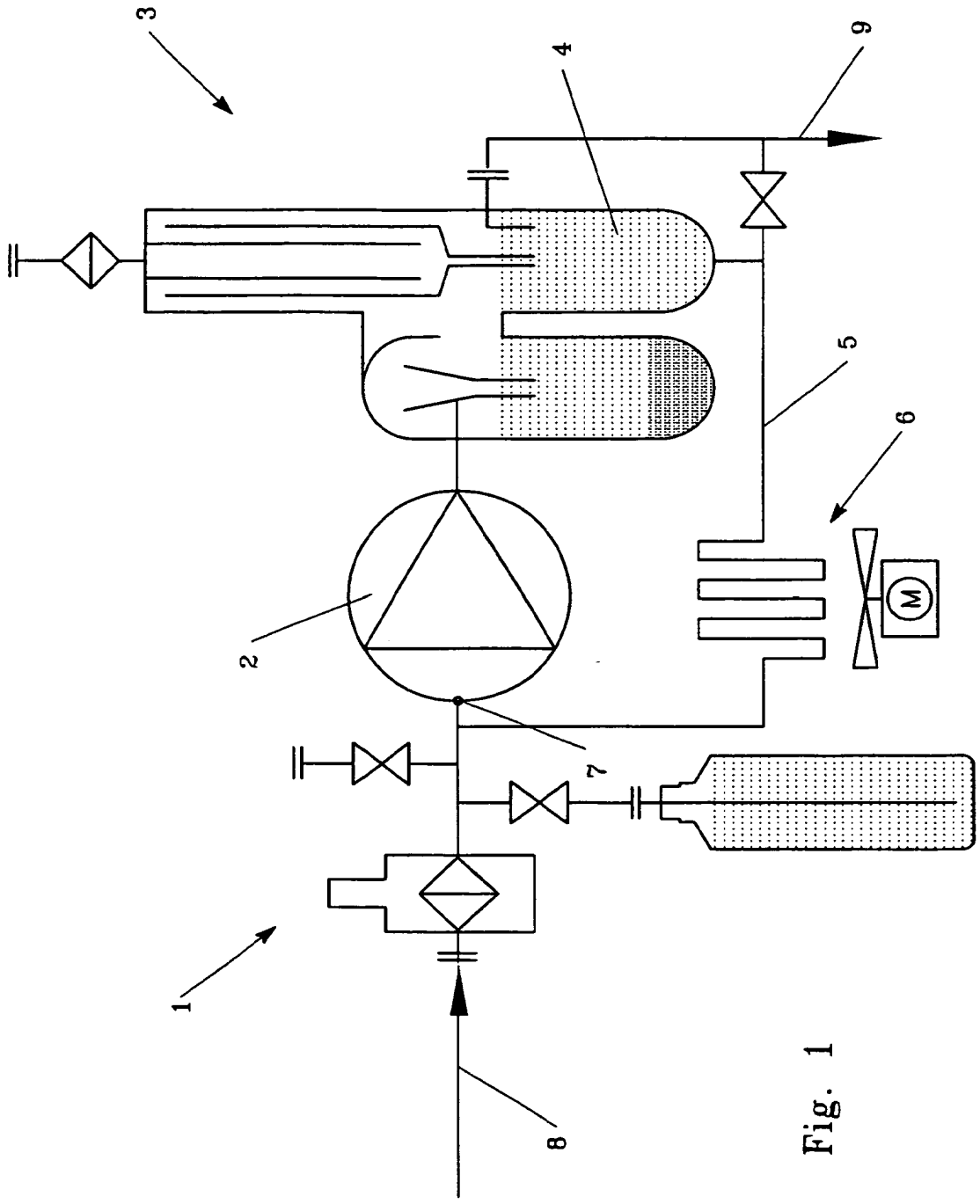

Fig. 1

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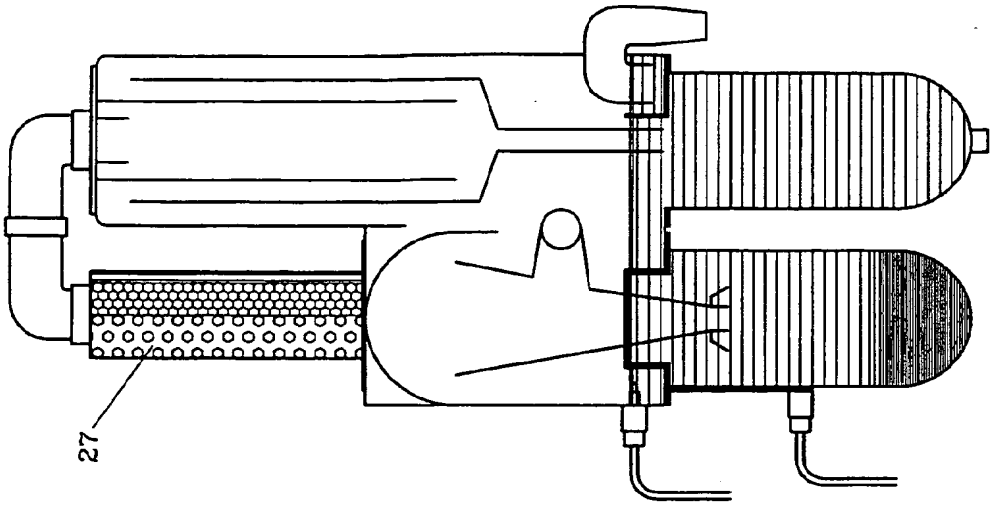

Fig. 2a

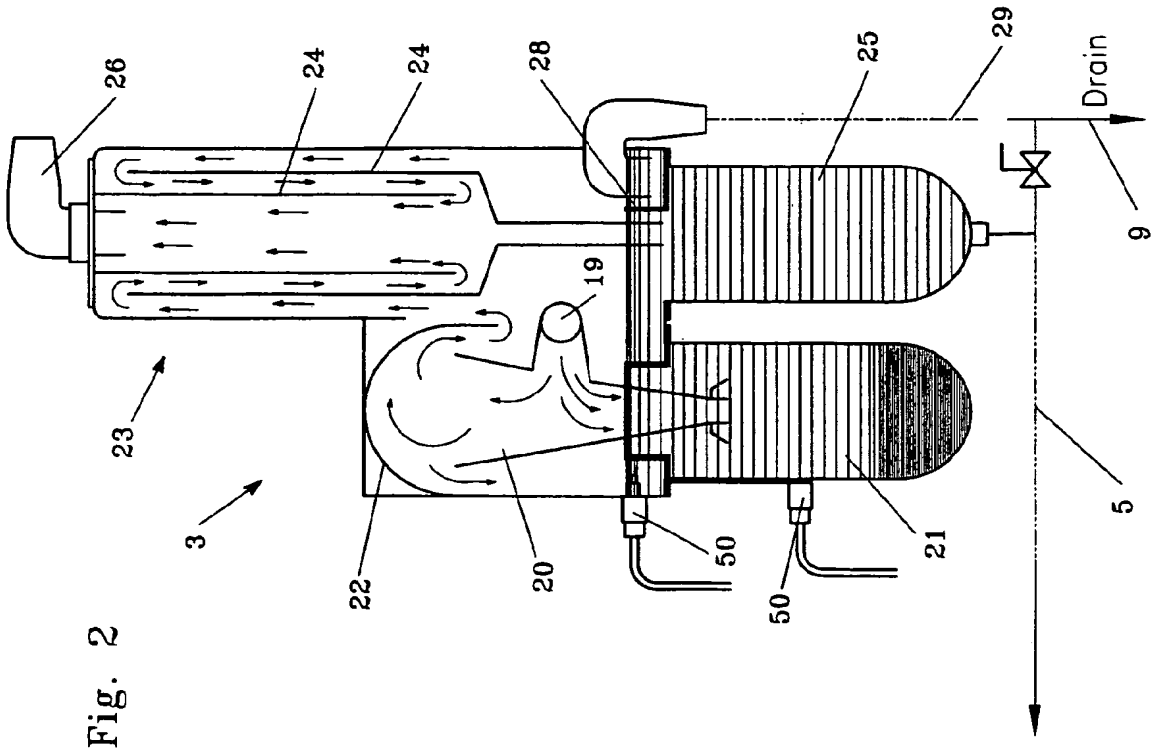

Fig. 2

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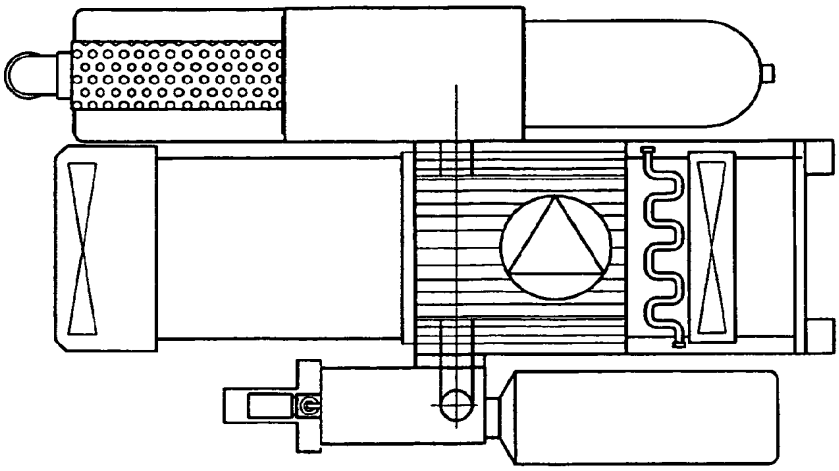

Fig. 4

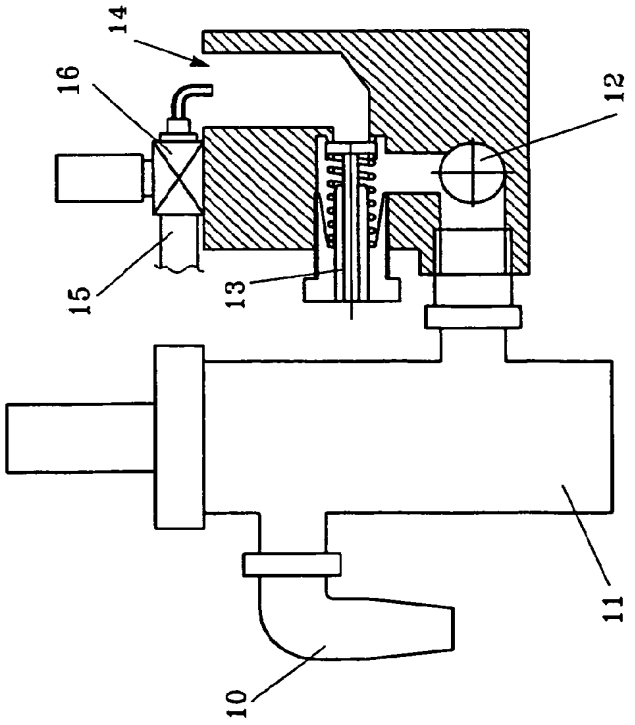

Fig. 3a

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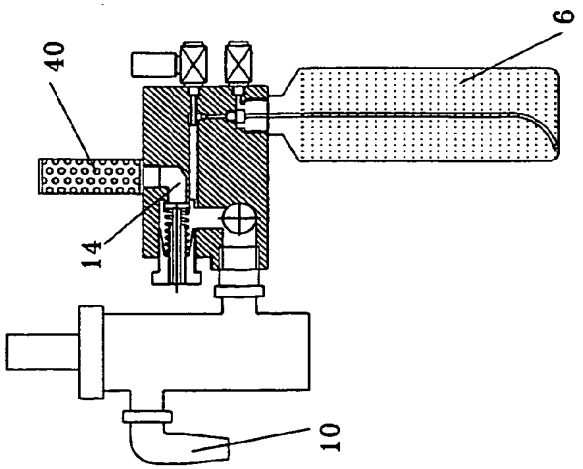

Fig. 3c

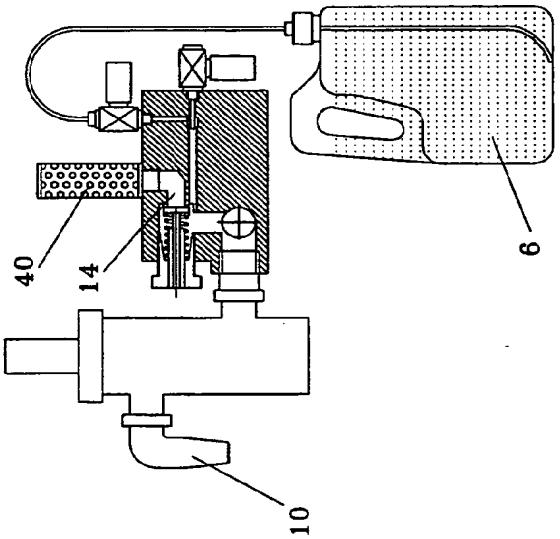

Fig. 3d

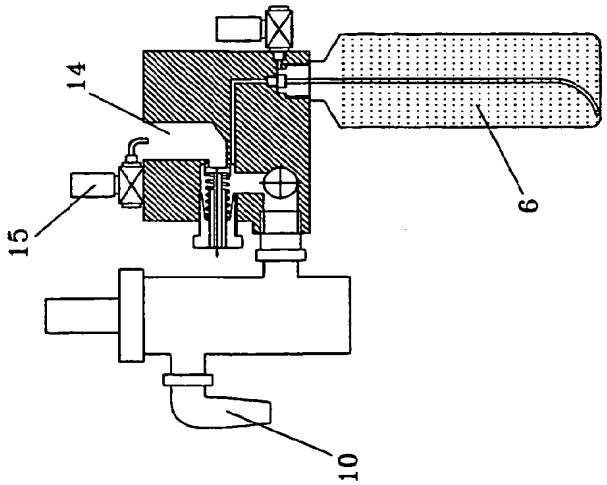

Fig. 3b

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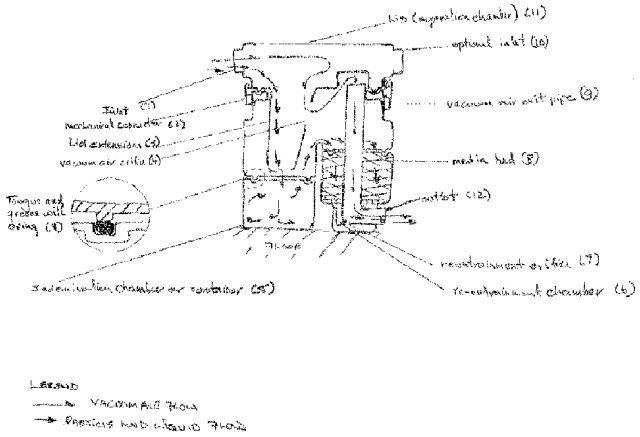
(57)

An amalgam separation and collection apparatus for the collecting and separation of amalgam in a dental vacuum waste stream. The apparatus has four primary chambers. The separation chamber is the connection point for the incoming waste flow and once the waste flow has entered the apparatus, the separation chamber allows the division of waste stream into vacuum air and water particle amalgam. The vacuum air is permitted to flow through the unit via vacuum exhaust tube and is unobstructed. The water/amalgam mixture is deposited from the separation chamber into the sedimentation chamber. Separation by sedimentation occurs in this chamber causing the larger amalgam particles to settle to the container base while the cleaner water raises and water falls under gravity into the filtration chamber. The wastewater with trace amalgam passes through a heavy metal removal bed in the filtration chamber. The purified amalgam free water collects in water re-entrainment chamber located of the base of the filtration chamber. The collected water is introduced to the vacuum air via an orifice in the vacuum exhaust tubing. A tube is connected to dental office vacuum pump permitting function. The amalgam waste is retained in two removable chambers namely the sedimentation and filtration chambers.



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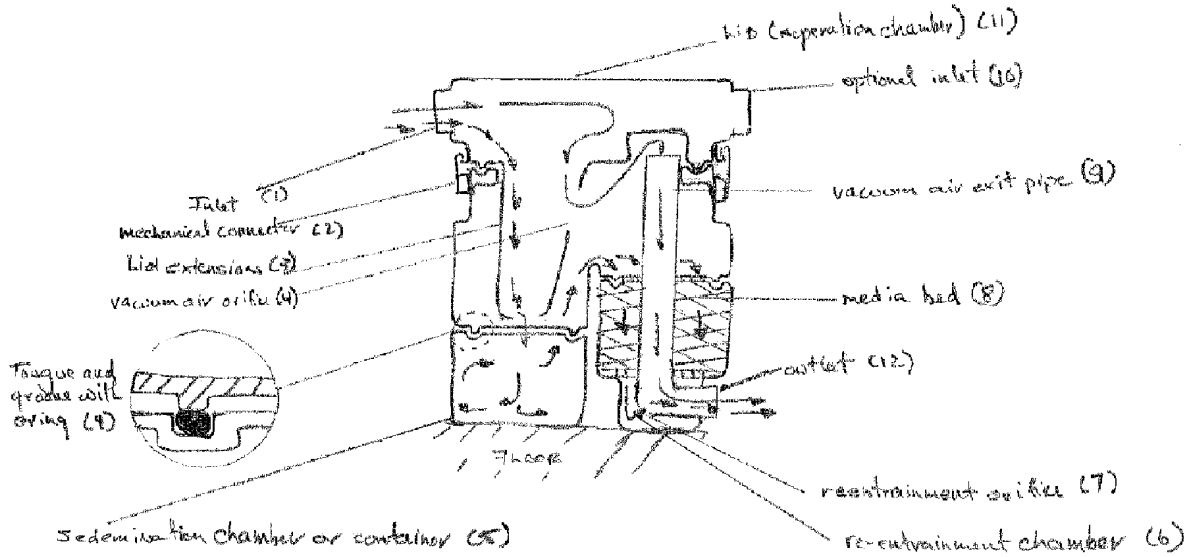
(54) Titre : SEPARATEUR D'AMALGAME
(54) Title: AMALGAM SEPARATOR



(57) Abrégé/Abstract:
An amalgam separation and collection apparatus for the collecting and separation of amalgam in a dental vacuum waste stream. The apparatus has four primary chambers. The separation chamber is the connection point for the incoming waste flow and once

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(21) 2 442 513
(13) A1

(57) Abrégé(suite)/Abstract(continued):
the waste flow has entered the apparatus, the separation chamber allows the division of waste stream into vacuum air and water particle amalgam. The vacuum air is permitted to flow through the unit via vacuum exhaust tube and is unobstructed. The water/amalgam mixture is deposited from the separation chamber into the sedimentation chamber. Separation by sedimentation occurs in this chamber causing the larger amalgam particles to settle to the container base while the cleaner water raises and water falls under gravity into the filtration chamber. The wastewater with trace amalgam passes through a heavy metal removal bed in the filtration chamber. The purified amalgam free water collects in water re-entrainment chamber located of the base of the filtration chamber. The collected water is introduced to the vacuum air via an orifice in the vacuum exhaust tubing. A tube is connected to dental office vacuum pump permitting function. The amalgam waste is retained in two removable chambers namely the sedimentation and filtration chambers.

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Abstract

An amalgam separation and collection apparatus for the collecting and separation of amalgam in a dental vacuum waste stream. The apparatus has four primary chambers. The separation chamber is the connection point for the incoming waste flow and once the waste flow has entered the apparatus, the separation chamber allows the division of waste stream into vacuum air and water particle amalgam. The vacuum air is permitted to flow through the unit via vacuum exhaust tube and is unobstructed. The water/amalgam mixture is deposited from the separation chamber into the sedimentation chamber. Separation by sedimentation occurs in this chamber causing the larger amalgam particles to settle to the container base while the cleaner water raises and water falls under gravity into the filtration chamber. The wastewater with trace amalgam passes through a heavy metal removal bed in the filtration chamber. The purified amalgam free water collects in water re-entrainment chamber located of the base of the filtration chamber. The collected water is introduced to the vacuum air via an orifice in the vacuum exhaust tubing. A tube is connected to dental office vacuum pump permitting function. The amalgam waste is retained in two removable chambers namely the sedimentation and filtration chambers.

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Description

Technical Field and Background

The present invention is a dental apparatus which is for the collecting of solid material from a vacuum line which is commonly used to remove solid and liquid from a patient's oral cavity during a procedure. The mixture of air, solids and liquid located in the vacuum line contains a high percentage of heavy metals primarily mercury, lead and copper. The untreated disposal of heavy metals offers a possible source of environmental pollution.

Various devices have been attempted to separate amalgam solids from liquid waste stream with limited success. This is primarily due to the difficulties in several areas: 1) removal of dissolved heavy metal such as mercury; 2) difficulty in service thus resulting in costly specialized personnel; 3) difficulty in removal of the amalgam or waste from the separator; 4) difficulty in transportation of waste for the purpose of disposal or recycling; 5) high cost due to material choices for the conventional manufacturing of a device which must withstand vacuum forces; 6) usually there is a large vacuum drop due to the device separation.

The present invention fulfills these needs and provides the related advantages.

Summary of Invention

The current invention collects solids and purifies liquid while permitting the unobstructed flow of vacuum air through the unit. This function ensures the environment is protected from possible pollution while not obstructing the volume or flow to the vacuum air and thus ensuring acceptable vacuum to ensure the dental procedures is not obstructed.

In preferred embodiment of the present invention the apparatus is a container which has several parts. Each part forms a chamber in which one function of liquid and solid purification occurs. All parts connect to a body to form a complete container or apparatus. The apparatus is connected to the patient from a tube be extending form the oral cavity to the inlet of the apparatus. A second tube connects from the outlet of the apparatus to the vacuum pump as found in a dental office.

The inlet part receives the suspended mixture of particles liquid and air. The mixture is separated within the lid which has a sufficient void capacity to act as a separation chamber. The separation permit's the vacuum to separate and flow via an orifice in the lid to an exit tube. The liquid and particles flow down an extension of the lid and into the sedimentation chamber. The sedimentation chamber is a separate container secured to the body of the apparatus mechanically. The sedimentation chamber has an o-ring and tongue and grove to form a liquid seal. The sedimentation chamber is removable. Particles within the mixture settle in the sedimentation chamber. The lean liquid is located at the upper portion of the container due to the force of gravity on the particles. The cleaner liquid over flows and passes through a media bed located in the filtration container. The filtration container is located a the base of the apparatus and is attached to the body mechanically. The filtration chamber is house in a container and contains an media bed designed for the removal of heavy metals suspended in liquid. The media bed is supported in the container by a support mesh located at the top and base of the media bed. The liquid and suspended metal pass through the media bed under gravity and collect in the re-entrainment chamber. The re-entrainment chamber is an area located in the filtration chamber below the media bed. The outlet of the unit connects the purified liquid to the vacuum pump at the location. Vacuum air and purified water are recombined at this point prior to existing the apparatus.

This is accomplished by means of an orifice located in the exit pipe were it passes through the re-entrainment chamber.

These and other aspects of the invention will become evident upon viewing the attached drawing and reviewing the detailed description.

Description of Drawing

1. Top view of apparatus with vacuum shown in dotted lines.

2. Side view of apparatus with vacuum shown in dotted lines.

3. Cross sectional view showing internal exit pipe and airing attachment.

Detailed Description of Invention

As previously mentioned, the present invention is an apparatus for the collecting and separating of amalgam solids from a mixture of solids, liquids and air present in a dental vacuum stream.

The present invention is represented in Fig. 1, Fig. 2 and Fig. 3.

Fig. 1 - Top View

A top view of the invention in Fig 1 shows the connection of the dental vacuum tube at patient (4) to the apparatus inlet (1). The connection of the outlet in shadow (5) to the typical dental vacuum pump (3). The mixture streat typically enters through an inlet at the top of the apparatus and exists via an outlet of the bottom or base of the apparatus.

Fig. 2 - Side View

A side view of the invention is represented in Fig 2. The lid (9) also functions as the inlet (1) and liquid, particle and air separation chambers. A mechanical connection (2) and o-ring seal (8) is used to connect the lid (9), sedimentation chamber (3) and filtration chamber (6) to the body (9). The seal is liquid and vacuum tight. The sedimentation chamber (3) and the filtration chamber (6) may be disconnected from the body (7) by releasing the mechanical connection (2). Thus enabling cleaning, recycling, replacement or disposal without specialized staff or equipment. The outlet (2) can be clearly seen and referenced in Fig 1.

Fig. 3 - Cross Section

In the preferred embodiment, the dental mixture enters the invention through the inlet(1) or the optional inlet (10). Both inlet are located in the lid which also functions as a separation chamber (11). In this chamber, the liquid and particles are directed towards the sedimentation zone (5) via an extension of the lid (3). The air is permitted to flow out of the apparatus unobstructed by passing through an orifice in the lid extension (4) thus preventing vacuum pressure reduction and continuing through a vacuum air exit pipe (9) and out the outlet (12).

The liquid and particle is collected in sedimentation zone (5). The heavy

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particles collect at the base of the sedimentation zone due to gravity. The liquid with dissolved heavy metals rises and over flows into the media bed (8). The liquid passes through the media bed assisted by gravity and collects in the re-entrainment chamber (6). The purified water is then re-entrained with the vacuum air via on an orifice (7) located in the vacuum air exit pipe (8). The purified water (air mixture exit's the apparatus via outlet (12) and continues to the vacuum pump.

The apparatus including lid, body, sedimentation chamber and filtration chamber is rotationally moulded thus reducing production cost.

From the foregoing, it will be appreciated that although the embodiment of the invention have been described various modification may be made without deviating from the spirit of the invention. According the invention is only limited by the claims.

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I claim

1. An amalgam collection and separation apparatus used to collect and purify the total mixture of liquid and solid particles found in a dental vacuum stream comprising of:

- a container having a lid which incorporates a chamber to allow separation of liquid and air in the waste stream and has interconnection orifice. A sedimentation chamber which allows the settling of heavy particles in the liquid waste stream. A filtration chamber which incorporates a media bed for the removal of fine and dissolved particles in the liquid waste stream. The filtration chamber also incorporates a water re-entrained area at its base for the reintroduction of purified wastewater to the vacuum air stream.

A body which incorporates a vacuum air exit pipe which permit the flow of vacuum air through the unit and re-entrainment of vacuum air and water prior to exiting the apparatus.

2. The apparatus of claim 1 where the container has a lid portion which houses the inlet, a body portion comprising the mid section, a sedimentation container which mounts to the body at the bottom and a filtration container which also mounts to the body at the bottom and has an outlet connection.

3. Apparatus as in Claim 1 where the containers are manufactured by rotational molding.

4. An apparatus in Claim 1 where the lid is removable.

5. Apparatus as in Claim 1 where the apparatus has no moving internal

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parts.

6. An apparatus in Claim 2 where the lid also function to separate liquid and gas streams through functioning as a separation chamber.

7. An apparatus in Claim 2 where the lid has an extended portion used to direct the liquid and particle waste into the unit bottom containers.

8. An apparatus in Claim 1 where the containers mounted to the body at the bottom are removable.

9 An apparatus as outlined in Claim 1 where one of the containers is used for the collection of large particle waste thus acting as a sedimentation chamber.

10 An apparatus as in Claim 1 where one container is used to hold a media bed thus acting as a filtration chamber.

11 An apparatus in Claim 1 where the media bed is activated carbon.

12. An apparatus as in Claim 8 where the base of the filtration container also functions as a purified water re-entrainment chamber whereby water can be re-introduced to the vacuum stream.

13. The apparatus of Claim 1 further incorporate a tongue and grove housing an o-ring seal which connects the lid sedimentation containers and filtration containers to the body forming a liquid tight seal.

14. The apparatus in Claim 1 where the individual container which function as chambers are connected together using a mechanical device designed to compress the o-ring resulting in a liquid tight seal.

15. A method of collecting and separating a mixture of particles and liquid from a patient under going a dental procedure the method of collection, separation and purification comprising the following steps:

Connection of the a collection apparatus to a vacuum source. The apparatus has an inlet which connects the apparatus to the patient via a tube. The apparatus has five primary parts: 1) lid which functions as a separation chamber; 2) body which houses the vacuum air exit pipe and to which all other components are attached; 3) collection container which function as a sedimentation chamber; 4) a filtration chamber which contains activated carbon and has a liquid containment area at its base.

Solid particles and liquid are drawn from the patient into the separation chamber where vacuum air or gas is separated from liquid and particles.

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Liquid and particles flow down an extended portion of the separation chamber and collects in the sedimentation chamber.

The separated vacuum air flows down the exit pipe and connects to the vacuum pump.

The collected liquid in the sedimentation chamber water falls into the filtration chamber and flows through a media bed. This is performed by gravity.

The purified liquid collects in a re-entrainment zone at the base of the filtration zone.

The purified liquid is re-entrained with the vacuum air via a small orifice located in the exit pipe within the re-entrainment zone.

16. An apparatus as in Claim 2 where separation chamber can one or more inlet connections.

17. The apparatus of Claim 2 has removable sedimentation and filtration chambers.

18. The apparatus in Claim 2 where the removable sedimentation and filtration chambers may act as shipping containers for the purpose of collection, shipping, disposal and/or recycling.

19. The apparatus in Claim 2 where the outlet is located at the bottom of the filtration container.

CA 02442513 2003-09-23

FIG 1

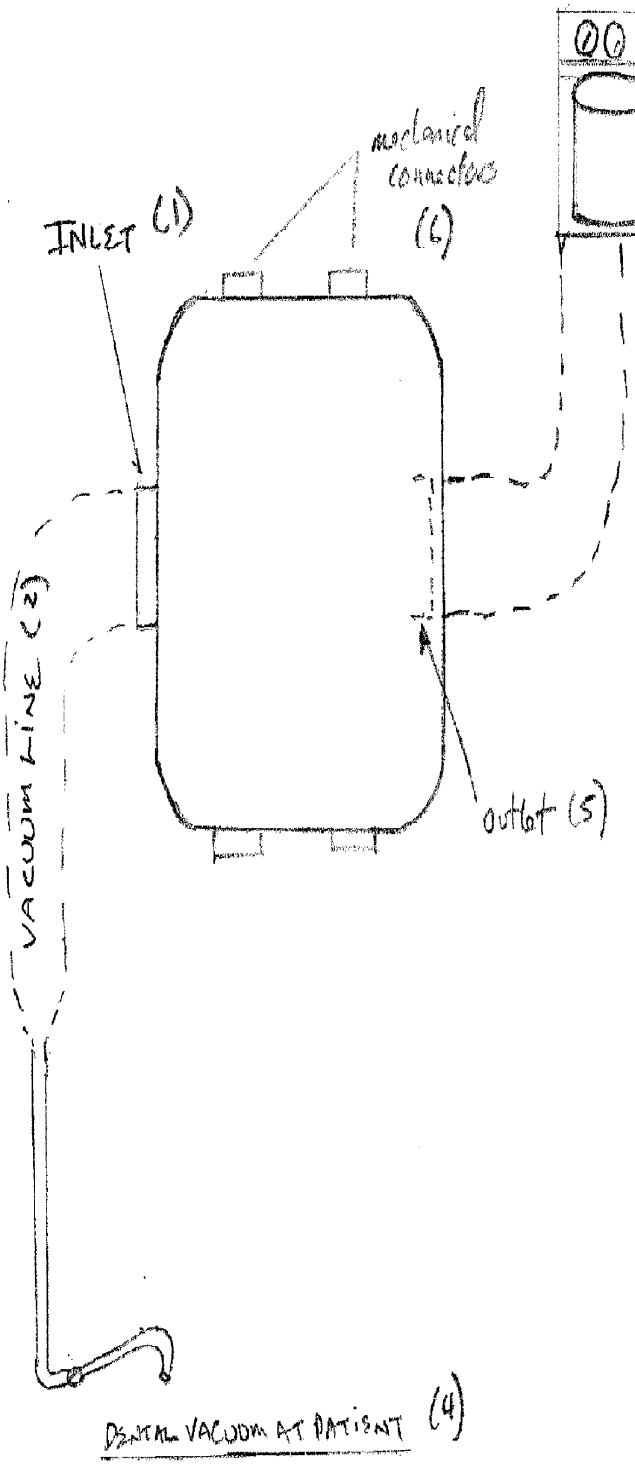
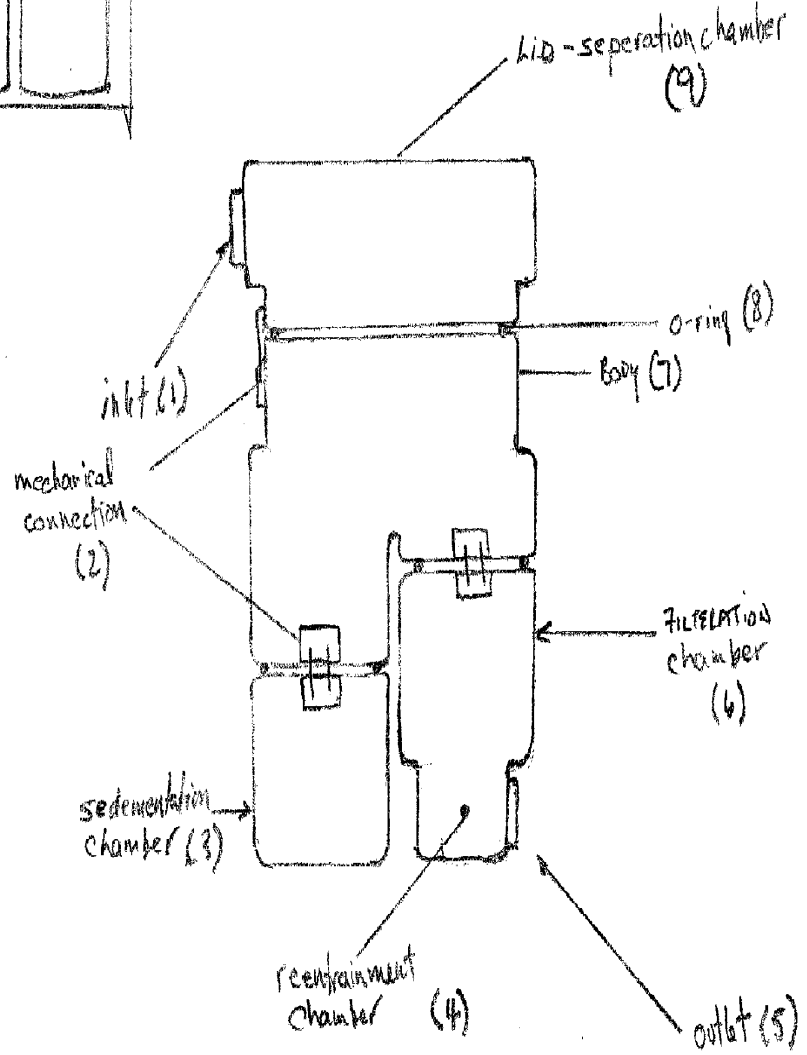


FIG 2



DRAWING-

AMALGAM SEPARATOR TOP ½ SIDE VIEW

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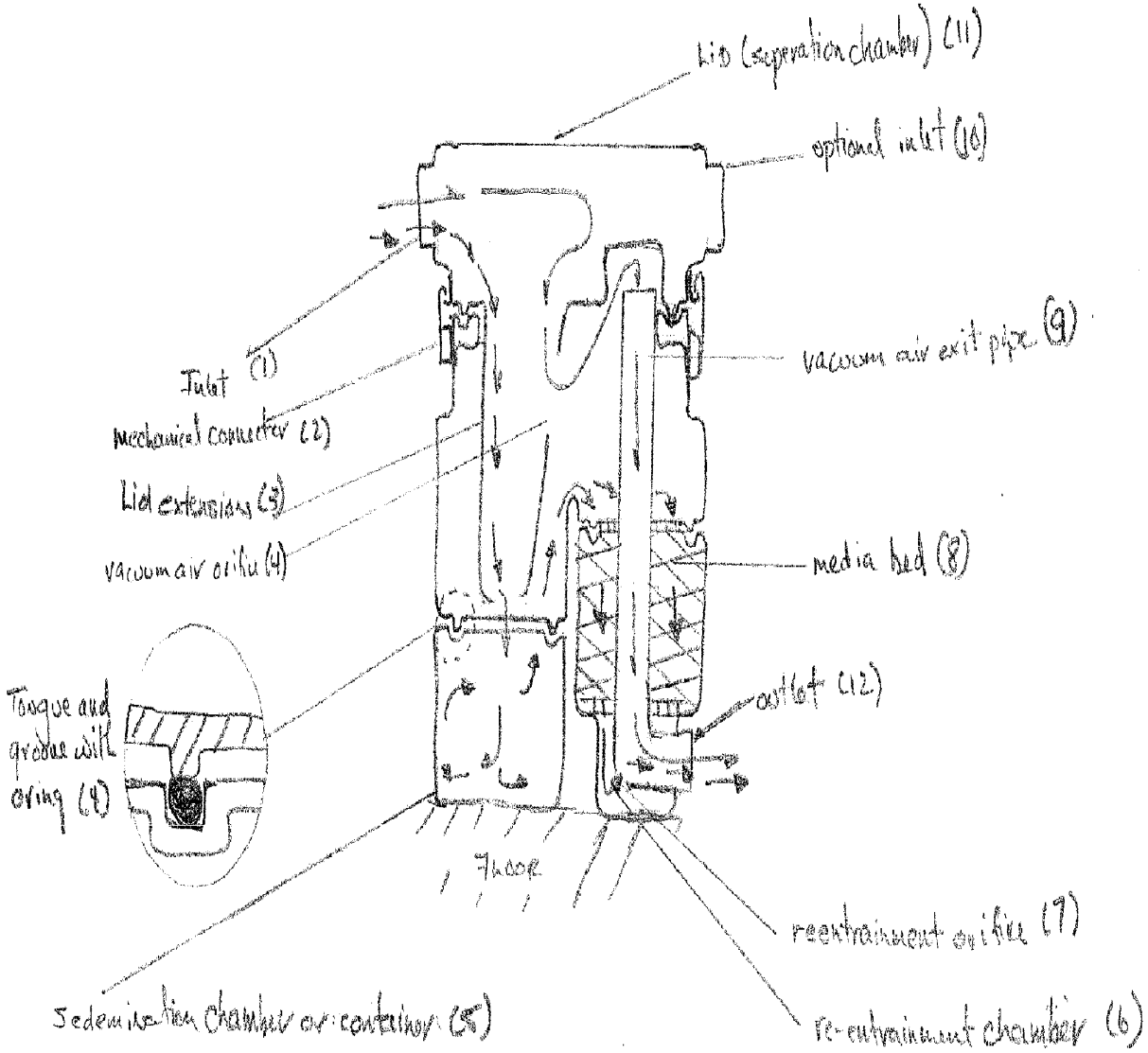
CA 02442513 2003-09-23

FIG 3



LEGEND

→ VACUUM AIR FLOW

→ PARTICLE AND LIQUID FLOW

Drawing

AMALGAM SEPERATOR CROSS SECTION.

RICHARD EMMETT

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(72) Inventor; and
(71) Applicant: **GHAZARYAN, Artyom** [AM/AM]; St. Movses Khorenatsi Bld. 26, apt. 50, 3126, Gyumri (AM).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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

(54) **Title:** FILTER FOR SUCTION SYSTEM OF DENTAL UNIT

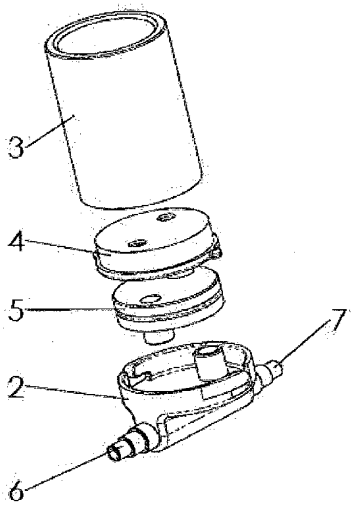

Fig.2

(57) Abstract: The invention relates to the sphere of medical devices, in particular to dental units and can be used in their suction systems. Filter for suction system of dental unit has a connecting module which has inlet and outlet hoses of content moved from suction system, single use filter consisting of the container receiving the content from suction system, rigidly attached covering in it and lock-fixer with a possibility of rotation installed in the covering. On the inner surface of module there is made a pipy projection concatenated with the output of module and a hole concatenated with the input of module, which are provided for attaching the filter to the module. Fixed notches are made on the side face of module. On the inner surface of covering are made inlet and with preventing mesh outlet holes and fixing projections on the outer surface of covering with a possibility of fixation in the fixing notches on side face of connecting module. The lock-fixer of covering has inlet and outlet pipy projections. The safety of filter system servicing is ensured, service time is reduced.

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Filter for suction system of dental unit

Technical field

The invention relates to the sphere of medical devices, in particular to dental units and can be used in their suction systems.

Background art

There are various filters (1-4) which are located in hydro blocks of dental devices or are built in separate suction systems. Those filters have inlet and outlet hoses, a covering to which mesh filter is attached. On that mesh with the help of inlet hose a content solid substance (pieces of tooth, filling, amalgam, blood clot and etc.) moved from suction system is collected which is arising during dental treatment.
The main deficiency of those filters is that at the end of each working day it is necessary to open the covering, remove the mesh filter, empty it, then wash, disinfect and place back. It's unpleasant, dirty, dangerous and time-consuming procedure.
By technicity the filter (5) of dental device suction system is much closer to the invention, which has a connecting module to which is attached the container receiving contents from suction system arising during dental treatment. A filter which has a preventing mesh is placed in the receiving container. The outlet hose is attached to the connecting module, from suction system moved content inlet hose is attached at the bottom of container.
During dental treatment the content of suction system is moved to the receiving container. The solid substance with the help of mesh filter remains in the container.
The deficiency of this filter is also that at the end of each working day it is necessary to disconnect the receiving container with filter from connecting module, empty, then wash, disinfect and again bring to working state.

Disclosure of invention

Object of the invention is to ensure the safety of dental device solid substance filter service and shorten its service time.
Essence of an invention is that in the filter of dental device suction system, which has a connecting module with its outlet hose, inlet hose, mesh filter and receiving container, according to the invention the inlet hose is attached to the input of connecting module, on the inner surface of connecting module there is made a pipy projection concatenated with the output of module and a hole concatenated with the input of module, on the side face of module there are made fixed notches and the filter additionally has a covering rigidly attached to the receiving container and installed in the covering lock-fixer with a possibility of rotation with its inlet and outlet pipy projections, on the outer surface of covering there are made

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projections with a possibility of fixation in the notches of module and on the inner surface of covering are made inlet and outlet holes moreover the mesh filter is placed on the hole of outlet covering.

Description od drawings

Essence of an invention is shown on the graphics depicted on the pictures from 1 to 6 where
on the picture 1 the general view of dental device suction system filter in operation is shown
on the picture 2 – structural diagram of filter
on the picture 3 – connecting module diagram of filter
on the picture 4 – covering diagram of filter
on the picture 5 – lock-fixer diagram installed in the covering with a possibility of rotation
on the picture 6 – view of the container receiving the contents moved from the suction system of filter

Best mode for carrying out the invention

The filter of dental device suction system has a connecting module (1) and a filter which consists of the container (2) receiving the content from suction system, covering (4) and installed in it lock-fixer (5) with a possibility of rotation.
The connecting module (2) is fixed at the hose of dental device hydro block suction system. The connecting module (2) has inlet (6) and outlet (7) hoses of content moved from suction system which may have variable outer diameter 6mm, 8mm, 10mm and it gives them an opportunity to connect both to large and small hoses of suction systems. The inlet (6) hose is attached to the input of connecting module (2), outlet (7) hose to the output.
On the inner surface of connecting module (2) is made a hole (8) concatenated with the input of module and a pipy projection (9) concatenated with the output of module, which are provided for attaching the filter to the module (2).
There are made fixed notches (10) on the side face of connecting module (2) through which the filter is fixed to the module.
The lock-fixer (5) with a possibility of rotation installed in the filter covering (4) has inlet (11) and outlet (12) pipy projections.
Inlet (13) and outlet (14) holes are made on the inner surface of filter covering (4), moreover a preventing mesh (15) is placed on the outlet hole with the help of which the solid substance remains in the container (3).
On the outer surface of covering (4) fixing projections (16) are made with a possibility of fixation in the fixing notches (10) on side face of connecting module (2).

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Filter covering (4) is rigidly attached with glue to the container (3) receiving content from suction system.
The connecting module (2) is designed for multiple use. It is made of polystyrene.
The filter is designed for single use. All parts of filter are made of polypropylene.
The suggested filter operates as follows:
When filter is attached to the connecting module (2), the lock-fixer rotates, the inlet (13) and outlet (14) holes of content moved from suction system of covering are opened and the filter is brought to operating position.
At the end of working day it is necessary to disconnect the filter from connecting module (2), during removal the lock-fixer is rotating closing the inlet (13) and outlet (14) holes of content moved from suction system of covering, whereby the filter is brought to non-operating state, in such a way non dropping of hard substance collected on preventing mesh which is installed on outlet hole of covering and non dropping of content of receiving container is ensured.
It is necessary to throw away the used filter, and new filter is attached to the connecting module (2).
The replacement of used filter with new one takes from 10 up to 20 minutes, thus the servicing of the filter becomes short and most importantly safe as the medical staff does not communicate with the content of filter.

Sources of information

Sirona. C8+Solo, C8+Solo Cart/Side delivery, C8+Cart Stand alone, C8+Side delivery Stand alone. Instruction manual, section10. Care and cleaning performed by the practicfe staff manuals.sirona.com/home.HomeDmsDocument.download.html?id=147

Operation manual. Dental devices DIPLOMAT ADEPT DA 370 DIPLOMAT ADEPT DA 380. http://www.eurmed.sk/fileadmin/eurmed/produkty/Diplomat_dental/da370_da380/subory/RU_DA370-DA380_CART_2013_06.pdf

Instruction on care. KaVo Primus® 1058 S/TM/C
Methods of preparation in accordance with the standard DIN EN ISO 17664.
2.6 Module processing of the patient
2.5.4 The preparation of strainer insert of suction hoses
file:///D:/Users/USER/Downloads/PA_1058_20131129_15_RU.PDF

FONA-2000L Dental device. Instruction manual. 5. Care, cleaning and servicing
www.dentex.ru/upload/iblock/67a/67a917fc2fbc571e021d1539d70d6388.pdf

Usage guidelines. Instruction/Installation/ Technical manual. Adaptable model ST-D520, ST-D530, ST-D307 – the closest comparison
www.medteh.info/_ld/18/1838_____**ST**-D307-520.doc

Applicant A. Ghazaryan

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Claims

Filter for suction system of dental unit, which has connecting module with its outlet hose, inlet hose, mesh filter and receiving container is characterized in that the inlet hose is attached to the input of connecting module, on the inner surface of connecting module there is made a pipy projection concatenated with the output of module and a hole concatenated with the input of module, on the side face of module there are made fixed notches and the filter additionally has a covering rigidly attached to the receiving container and installed in the covering a lock-fixer with a possibility of rotation with its inlet and outlet pipy projections, on the outer surface of covering there are made projections with a possibility of fixation in the notches of module and on the inner surface of covering are made inlet and outlet holes moreover the mesh filter is placed on the hole of outlet covering.

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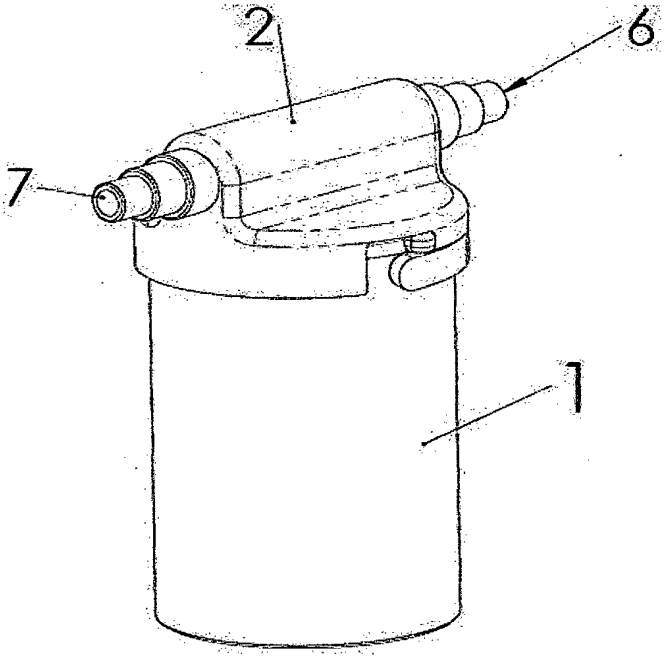

Fig.1

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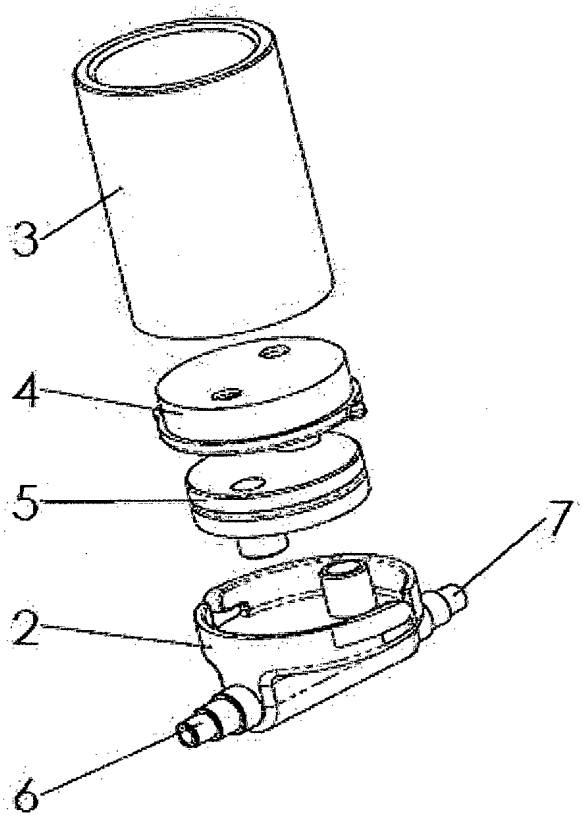

Fig.2

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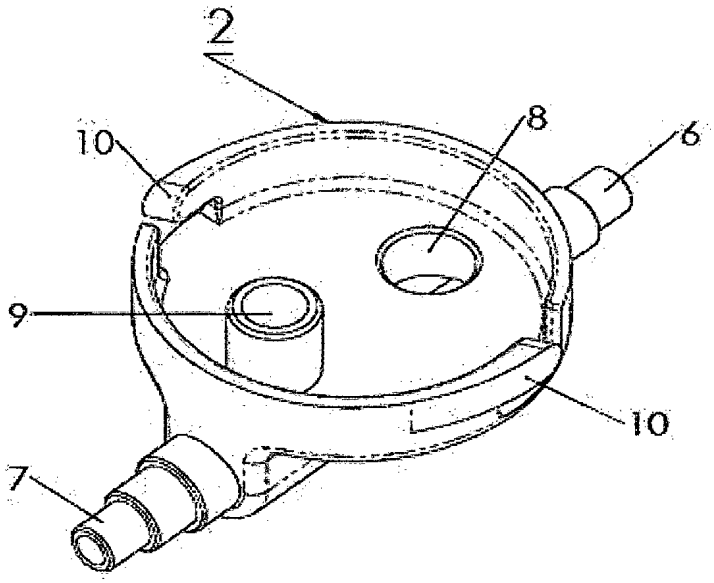

Fig.3

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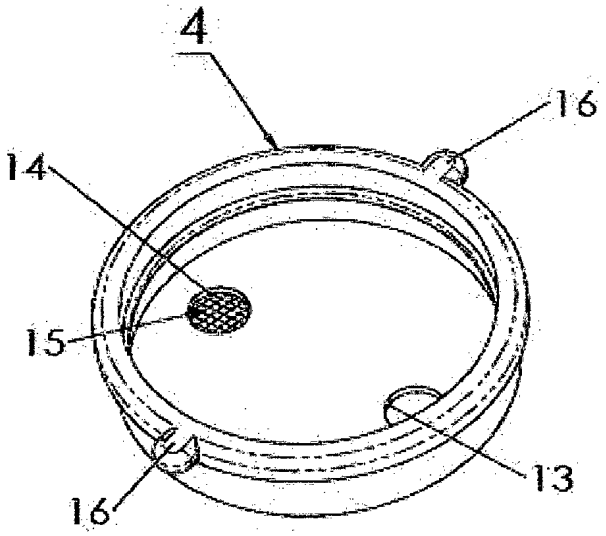

Fig.4

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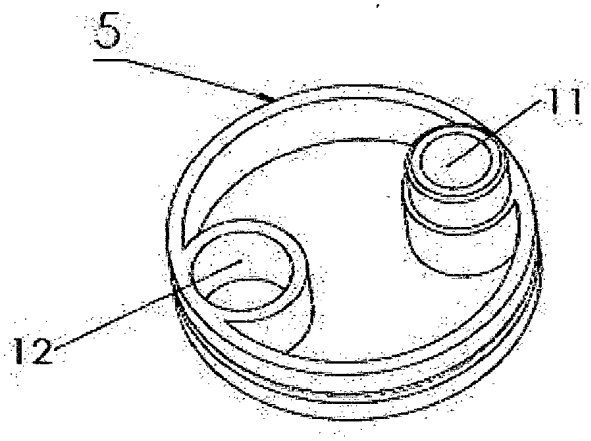

Fig.5

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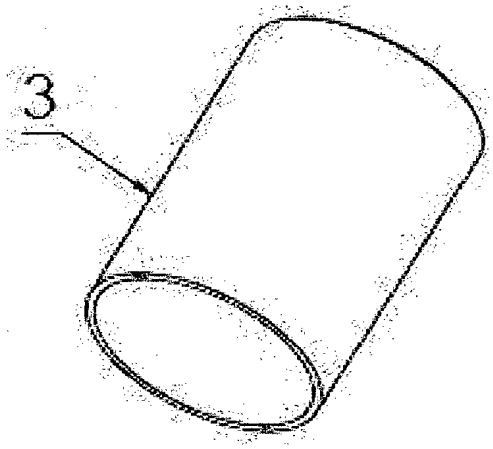

Fig.6

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INTERNATIONAL SEARCH REPORT

International application No
PCT/AM2017/000003

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61C17/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61C B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 700 412 A (MANUEL JOHN L [US]) 20 October 1987 (1987-10-20) column 2, line 8 - column 3, line 41 figures 1-4	1
A	US 5 336 406 A (STANFORD RALPH F [US] ET AL) 9 August 1994 (1994-08-09) column 2, line 45 - column 6, line 44 figures 1-8	1
A	US 3 777 403 A (RITCHIE J) 11 December 1973 (1973-12-11) column 1, line 53 - column 2, line 57 figure 1	1

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 August 2017	21/08/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pisseloup, Arnaud

1

Form PCT/ISA/210 (second sheet) (April 2005)

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INTERNATIONAL SEARCH REPORT

International application No
PCT/AM2017/000003

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 83/02720 A1 (HORN LASSEN HANS; BUCHHORN AKSEL JOHAN) 18 August 1983 (1983-08-18) page 5, line 5 - page 8, line 14 figures 1,2	1
A	KR 101 300 050 B1 (CHOI WOO HYUN [KR]) 29 August 2013 (2013-08-29) paragraphs [0014] - [0030] figures 1-5	1

1

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AM2017/000003

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

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

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

2. ☒ Claims Nos.: 1(partially)
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

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

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

This International Searching Authority found multiple inventions in this international application, as follows:

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

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

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

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

Remark on Protest

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

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

☐ No protest accompanied the payment of additional search fees.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 1(partially)

The claim is not clear as to which features belong to the subject-matter of the invention, and in particular the wording "which has connecting module with its outlet hose, inlet hose, mesh filter and receiving container" is such that it is not clear whether the features listed after the conjunction are features that come in addition of the connecting module or they are comprised in the connecting module.

The feature "lock-fixer" has no well recognized meaning, such that the claim is not clear.

Furthermore, from the wording "a lock-fixer with a possibility of rotation with its inlet and outlet pipy projections", it is also unclear which technical features are required for the lock-fixer to rotate, such that it would not be obvious for the skilled person to make the lock-fixer and consequently the claimed invention (Art. 5 PCT).

In addition, the partial absence of articles in front of some technical features, like for instance in the wording "the input of connecting module" or "placed on the hole of outlet covering", is such that it is not clear if they refer to a previously define feature or to an additional new feature.

For all the above mentioned reasons, the subject-matter of claim 1 is not in compliance with the clarity requirement of Article 6 PCT. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines, 9.19 and 9.24).

The extent of the search was consequently carried out on the basis of the description and figures, such that the filter (assembly) of the claimed subject-matter is resumed only to the following list of technical features:

a filter (assembly) of a dental device suction system comprising:

(i) a fixed connection module having an inlet and outlet ports, a side, an upper and an inner surfaces, and

(ii) a container,

(iii) a filter covering having an inner and outer surfaces, and

(iv) a lock-fixer having an inlet and an oulet pipy projections (note that on figure 5, the outlet 12 consist of a hole and has no pipy projection),

wherein the inner surface of the connection module comprises a hole concatenated with the input port and a pipy projection concatenated with the output port,

wherein the side surface of the connection module comprises fixed notches,

wherein the inner surface of the filter covering comprises an inlet and outlet holes,

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

wherein a preventing mesh is present on the outlet hole,
wherein the
outer surface of the filter covering comprises fixing projections for being inserted in the notches of the connection module.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/AM2017/000003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		NL 8320015 A	01-11-1983
		WO 8302720 A1	18-08-1983
KR 101300050 B1	29-08-2013	NONE	

PCT WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation [5] :
A61C 17/06

A1

(11) Internationale Veröffentlichungsnummer: **WO 94/16643**

(43) Internationales Veröffentlichungsdatum: 4. August 1994 (04.08.94)

(21) Internationales Aktenzeichen: PCT/AT93/00199

(22) Internationales Anmeldedatum: 27. December 1993 (27.12.93)

(30) Prioritätsdaten:
A 96/93 22. Januar 1993 (22.01.93) AT

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(81) Bestimmungsstaaten: AU, CA, JP, US, europäisches Patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: DENTAL TRAP

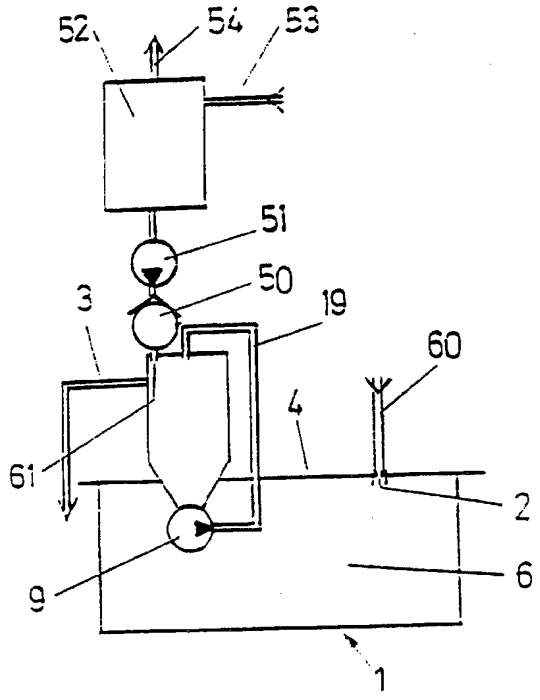
(54) Bezeichnung: ZAHNÄRZTLICHER ABSCHEIDER

(57) Abstract

Solids from two separately supplied (60, 61) mixtures of solids and liquids are collected together in a dental trap with a collecting basin (6) which may be removed from a centrifuge (5). The first mixture is taken from a suction air separator (52) under negative pressure and is brought into the centrifuge (5). The mixture of solids and liquids flows out of a spittoon under the effect of gravity and is directly brought into the collecting basin (6). Residual liquid which accumulates above the solids is conveyed into the centrifuge (5) by means of an arrangement (9, 16, 19) provided with an inlet (61) for the first mixture, an outlet (3) for the separated liquid and a solids discharge (12) that leads into the collecting basin (6).

(57) Zusammenfassung

In einem zahnärztlichen Abscheider mit einem von einer Zentrifuge (5) abnehmbaren Sammelbehälter (6) werden gemeinsam Feststoffe aus zwei getrennt zugeführten (60, 61) Feststoff-Flüssigkeitsgemischen gesammelt. Das erste Gemisch wird aus einer unter Unterdruck stehenden Saugluftabscheideeinrichtung (52) ausgetragen und in die Zentrifuge (5) eingebracht. Das Feststoff-Flüssigkeitsgemisch fließt aus einer Speischale durch Schwerkraft ab und wird unmittelbar in den Sammelbehälter (6) eingebracht. Sich oberhalb der Feststoffe sammelnde Restflüssigkeit wird mittels einer Einrichtung (9, 16, 19) in die Zentrifuge (5) überführt, die einen Einlaß (61) für das erste Gemisch, einen Auslaß (3) für die abgetrennte Flüssigkeit und einen in den Sammelbehälter (6) führenden Feststoffablauf (12) aufweist.



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Codes zur Identifizierung von PCT-Vertragsstaaten auf den Kopfbögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

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Zahnärztlicher Abscheider

Die Erfindung betrifft einen zahnärztlichen Abscheider mit einem abnehmbaren Sammelbehälter zum gemeinsamen Sammeln von Feststoffen, die aus einem ersten Feststoff-Flüssigkeitsgemisch, das aus einer unter Unterdruck stehenden Saugluftabscheideeinrichtung ausgetragen wird, und aus einem zweiten Feststoff-Flüssigkeitsgemisch abgetrennt werden, das aus einer Speischale durch Schwerkraft abfließt, mit einer Vollmantelzentrifuge, die einen Einlaß für das aus dem Unterdruck auszutragende erste Feststoff-Flüssigkeitsgemisch, einen Auslaß für die abgetrennte Flüssigkeit, und einen Feststoffablauf aufweist, durch den nach jeder Zentrifugierphase unter Schwerkrafteinwirkung Feststoffe mit einem Restflüssigkeitsanteil in den Sammelbehälter abfließen, mit einem Einlaß für das Speischalengemisch und mit einer Einrichtung zur Überführung der sich im Sammelbehälter oberhalb der Feststoffe sammelnden Flüssigkeit zum Einlaß der Zentrifuge.

Ein derartiger Abscheider ist beispielsweise in der EP-A 432 142 beschrieben. Dort sind auf einer gemeinsamen Antriebswelle eine Pumpe und ein Zentrifugenbehälter vorgesehen, wobei das erste Feststoff-Flüssigkeitsgemisch gegen den Saugluftunterdruck in eine zwischen der Pumpe und dem Zentrifugenbehälter ausgebildete Gemischeinlaßkammer eingebracht wird. In die unter Normaldruck stehende Gemischeinlaßkammer mündet auch der Ablauf der Speischale, sodaß also die beiden Gemische vereinigt und durch die Zentrifuge in Flüssigkeit und Feststoffe getrennt werden. Vom Sammelbehälter unter der Zentrifuge wird überstehende Restflüssigkeit, die einen Feststoffanteil enthält, wieder zur Zentrifuge zurückgeführt. Da der Speischalenablauf frei in die Zentrifugenkammer öffnet, werden die Geräusche der

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laufenden Zentrifuge über das in den Raum offene Ablaufrohr durch die Speischale nach außen übertragen. Da die Zentrifuge durch das offene Ablaufrohr Luft ansaugt, werden die gurgelnden Geräusche noch verstärkt und wirken sich störend und belästigend am Arbeitsplatz aus.

Die Erfindung hat es sich nun zur Aufgabe gestellt, bei einem Abscheider der eingangs genannten Art die Geräuschentwicklung zu verringern, und löst dies dadurch, daß der Einlaß für das Speischalengemisch dem Sammelbehälter zugeordnet ist.

Die Zentrifuge ist somit hinsichtlich des ersten Gemisches vor und hinsichtlich des zweiten Gemisches nach dem Sammelbehälter angeordnet, da aus dem ersten Gemisch alle Feststoffe die Zentrifuge passieren und dann in den Sammelbehälter gelangen, während aus dem zweiten Gemisch nur der nicht sedimentierte Teil der Feststoffe in die Zentrifuge befördert wird. Die Geräuschentwicklung ist wesentlich geringer, da über den offenen Speischalenablauf keine Luft angesaugt wird.

In einer ersten Ausführung ist vorgesehen, daß der Abscheider einen mit Durchtrittsöffnungen versehenen Montagegrundkörper aufweist, auf dem das Zentrifugengehäuse angeordnet ist, und an dem der Sammelbehälter nach unten abnehmbar gehalten ist, wobei der Einlaß für das Speischalengemisch im Montagegrundkörper angeordnet ist.

Diese Ausführung erleichtert nicht nur die Montage des Abscheiders insbesondere bei der Nachrüstung bereits bestehender Arbeitsplätze, da die Montagegrundkörper entsprechend den jeweils örtlichen Gegebenheiten ausgebildet sein können, sondern erlaubt es auch, die Dimen-

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sionen, vor allem Länge und Breite des Absetzbehälters unabhängig von den Maßen des Zentrifugengehäuses zu wählen, an die der Absetzbehälter bei direktem Anbau an die Zentrifuge gebunden ist.

Für eine räumlich sehr kompakte Ausführung kann vorgesehen sein, daß sich das Zentrifugengehäuse zum Montagegrundkörper hin verjüngt und der Einlaß für das Speischalengemisch in dem von der Verjüngung des Zentrifugengehäuses ausgesparten Bereich des Montagegrundkörpers vorgesehen ist. Als Einlaß ist bevorzugt ein um eine zum Montagegrundkörper senkrechte Achse schwenkbares Winkelstück für einen in beliebige Richtung verdrehbaren Anschluß im ausgesparten Bereich angeordnet. Eine Pumpe der Überführungseinrichtung für die Restflüssigkeit ist vorzugsweise koaxial unterhalb der Zentrifuge vorgesehen und kann einen eigenen Antriebsmotor aufweisen. Pumpe und Zentrifuge können aber auch von einem gemeinsamen, dazwischenliegenden Antriebsmotor betrieben werden, da bei laufender Pumpe auch die Zentrifuge arbeiten muß.

Nachstehend wird nun die Erfindung an Hand der Figuren der beiliegenden Zeichnungen näher beschrieben, ohne darauf beschränkt zu sein.

Die Fig. 1 zeigt schematisch eine Abscheideeinrichtung zur Trennung von Saugluft, Feststoffen und Flüssigkeit, und die Fig. 2 einen Vertikalschnitt durch einen erfindungsgemäßen Abscheider.

Eine Abscheideeinrichtung besteht aus einer Luftabscheidevorrichtung 52 mit einer Zuflußleitung 53, für ein aus dem Mund eines Patienten abgesaugten ersten Feststoff-Flüssigkeitsgemisch und einer wegführenden Reinluftleitung 54, sowie einem Abscheider 1 zur Tren-

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nung der Feststoffe von der Flüssigkeit. Der Abscheider 1 liegt außerhalb des Unterdrucksystems, d.h. zwischen der Luftabscheidevorrichtung 52 und einem Gemischeinlaß 61 für das erste Feststoff-Flüssigkeitsgemisch ist eine Pumpe 51 und an deren Rückseite ein Rückschlagventil 50 vorgesehen. Der Abscheider 1 setzt sich aus einer Vollmantelzentrifuge 5 und einem unter der Zentrifuge 5 angeordneten Sammelbehälter 6 zur Sedimentation von Feststoffen zusammen. Beide sind an einem Montagegrundkörper 4 angeordnet, der an einem zahnärztlichen Stuhl od.dgl. befestigbar ist, wobei der Sammelbehälter 6, wie aus Fig. 2 näher ersichtlich ist, vom Montagegrundkörper 4 nach unten abnehmbar gehalten ist. Am Sammelbehälter 6 ist ein Einlaß 2 für ein von einer Speischale kommendes, zweites Feststoff-Flüssigkeitsgemisch vorgesehen. Der Einlaß 2 ist daher von der Zentrifuge 5 räumlich getrennt, sodaß die Übertragung von Zentrifugengeräuschen über die Speischalenleitung 60 verringert ist.

Der Montagegrundkörper 4 ist mit Befestigungsbohrungen versehen, die insbesondere an einem eigenen Adapterteil 27 vorgesehen sind. Je nach den gegebenen Einbauverhältnissen sind dann entsprechende Adapterteile 27 vorhanden, mit denen der Montagegrundkörper 4 versehen werden kann. Weitere Durchtrittsöffnungen im Montagegrundkörper 4 sind: eine Öffnung zur Aufnahme des Motors 7 der Zentrifuge 5 und einer Pumpe 9, eine Öffnung zum Einsetzen des Feststoffablaufes 12 der Zentrifuge 5, eine Öffnung zur Durchführung einer nur schematisch gezeigten Verbindungsleitung 19 zwischen der Pumpe 9 und der Zentrifuge 5, Öffnungen für Befestigungsschrauben zur gemeinsamen Fixierung des Zentrifugengehäuses 8 und des Pumpengehäuses 13, sowie der Einlaß 2 für das von der Speischale kommende zweite Feststoff-Flüssigkeitsgemisch 60.

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Das auf dem Montagegrundkörper 4 fixierte Zentrifugengehäuse 8 ist im unteren Teil verjüngt, wobei der Motor 7 zentral angeordnet ist, und enthält darüber zwei ineinander angeordnete Zentrifugenbehälter 28 der Vollmantelzentrifuge 5. In den inneren Zentrifugenbehälter 28 mündet der Einlaß 10 für das von der Pumpe 9 über die Verbindungsleitung 19 aus dem Sammelbehälter 6 hochgeförderte Gemisch und der äußere Zentrifugenbehälter 28 weist eine Übertrittsöffnung 11 auf, über die gereinigte Flüssigkeit in den Flüssigkeitsauslaß 3 gelangt. Feststoffe fließen mit Restflüssigkeit bei Stillstand der Zentrifuge 5 aufgrund der Schwerkraft nach unten und gelangen über den exzentrisch angeordneten Feststoffablauf 12 in den Sammelbehälter 6. In den Einlaß 2 für das Speischalengemisch 60 ist drehbar ein nicht gezeigtes Winkelanschlußstück eingesetzt. Sowohl der Einlaß 2 als auch der Anschluß 16 für die Verbindungsleitung 19 liegen in der durch die Verjüngung des Zentrifugengehäuses 8 bedingten Aussparung 20, also innerhalb des von der Zentrifuge 5 benötigten Raumes, sodaß eine äußerst kompakte, platzsparende Ausführung gegeben ist.

Ein nach unten offene Nut 29 des Montagegrundkörpers 4 dient dem Einschub des Sammelbehälters 6. Dieser ist mittels eines bügelförmigen Verriegelungselementes 70 fixiert, das um eine Achse 75 an der Außenwand der Nut 29 schwenkbar gelagert ist. Das Verriegelungselement 70 weist zwei seitlich außerhalb des Sammelbehälters 6 sich erstreckende Schwenkarme 71 und einen diese verbindenden Quersteg 72 auf. Jedem Schwenkarm 71 ist ein dazu parallel verlaufender Steg 77 zugeordnet, der in der Schließstellung in eine Tasche 68 des Sammelbehälters 6 eingreift. Der Sammelbehälter 6 ist aus lichtdurchlässigem Kunststoff gefertigt und weist an seiner

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zum Quersteg 72 weisenden Wandung eine vorstehende Längsrippe 66 auf. Der Quersteg 72 ist mit parallel zu den Seitenwänden der Längsrippe 66 abstehenden Laschen 73 versehen, an denen eine Sensoreinrichtung 74 ausgebildet ist. Diese umfaßt zumindest eine, im gezeigten Ausführungsbeispiel zwei Lichtschranken, wobei jeder Lichtstrahl die Längsrippe 66 durchdringt und der Messung der Sedimentationshöhe der Feststoffe dient. Die untere Lichtschranke reagiert bei 95 % der maximalen Füllhöhe durch ein Warnsignal, während bei Ansprechen der zweiten, die maximale Füllhöhe anzeigenden oberen Lichtschranke der Abscheider, vorzugsweise die gesamte Absauganlage, außer Betrieb gesetzt wird. Für den Wechsel des Sammelbehälters 6 wird das Verriegelungselement 70 hochgeschwenkt, sodaß die Stege 77 den Sammelbehälter 6 freigeben, der dann nach unten abgenommen werden kann. Die Sensoreinrichtung 74 könnte noch weitere Sensorelemente umfassen, die beispielsweise jene beiden Niveaus der sich über den Feststoffen sammelnden Flüssigkeit erfassen, an denen der Motor 7 ein- und ausgeschaltet wird.

Das Pumpengehäuse 13 ist an der Unterseite des Montagegrundkörpers 4 befestigt, und am hochstehenden Anschluß 16 kann nach der Befestigung von Pumpe 9 und Zentrifuge 5 die Verbindungsleitung 19 montiert werden. Vom Pumpengehäuse 13 nach unten ragt ein zentrales Ansaugrohr 14, das im obersten Teil sich konisch verjüngt, im Mittelteil zylindrisch ausgebildet ist, und im untersten Teil umfangsseitige Durchbrechungen aufweist. Ein Schutzsieb 15 ist zumindest an der Seite des Einlasses 2 des Speischalengemischs los am Ansaugrohr 14 fixiert. Die Pumpe 9 weist ein Flügelrad 17 auf, das eine Nabe 41, von dieser radial abstehende Flügel 42 und einen nach unten in den konischen Teil des Ansaugrohres 14 ragenden Hohlkegelstumpf 18 umfaßt.

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Patentansprüche:

1. Zahnärztlicher Abscheider mit einem abnehmbaren Sammelbehälter (6) zum gemeinsamen Sammeln von Feststoffen, die aus einem ersten Feststoff-Flüssigkeitsgemisch, das aus einer unter Unterdruck stehenden Saugluftabscheideeinrichtung (52) ausgetragen wird, und aus einem zweiten Feststoff-Flüssigkeitsgemisch abgetrennt werden, das aus einer Speischale durch Schwerkraft abfließt, mit einer Vollmantelzentrifuge (5), die einen Einlaß (61) für das aus dem Unterdruck auszutragende erste Feststoff-Flüssigkeitsgemisch, einen Auslaß (3) für die abgetrennte Flüssigkeit, und einen Feststoffablauf (12) aufweist, durch den nach jeder Zentrifugierphase unter Schwerkrafteinwirkung Feststoffe mit einem Restflüssigkeitsanteil in den Sammelbehälter (6) abfließen, mit einem Einlaß (2) für das Speischalengemisch und mit einer Einrichtung (9,16,19) zur Überführung der sich im Sammelbehälter (6) oberhalb der Feststoffe sammelnden Flüssigkeit zum Einlaß (61) der Zentrifuge (5), dadurch gekennzeichnet, daß der Einlaß (2) für das Speischalengemisch dem Sammelbehälter (6) zugeordnet ist.

2. Abscheider nach Anspruch 1, dadurch gekennzeichnet, daß er einen mit Durchtrittsöffnungen versehenen Montagegrundkörper (4) aufweist, auf dem das Zentrifugengehäuse (8) angeordnet ist, und an dem der Sammelbehälter (6) nach unten abnehmbar gehalten ist, wobei der Einlaß (2) für das Speischalengemisch im Montagegrundkörper (4) angeordnet ist.

3. Abscheider nach Anspruch 2, dadurch gekennzeichnet, daß der Einlaß (2) für das Speischalengemisch an einem um eine zum Montagegrundkörper (4) senkrechte Achse schwenkbaren Winkelstück ausgebildet ist.

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Fig. 1

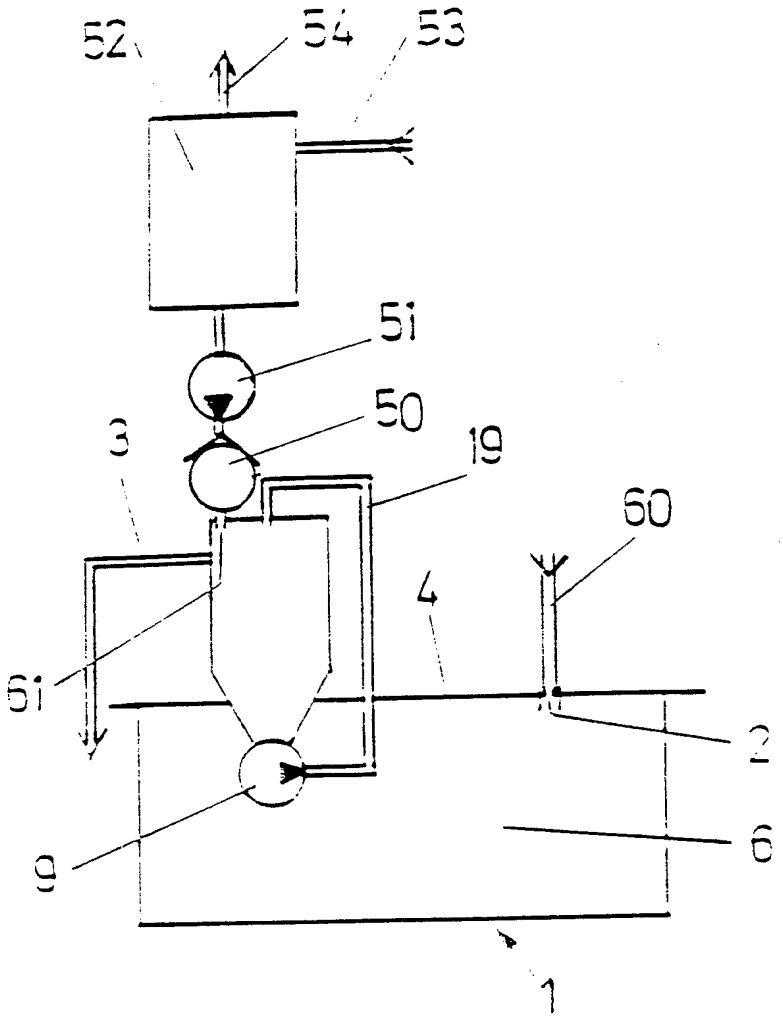

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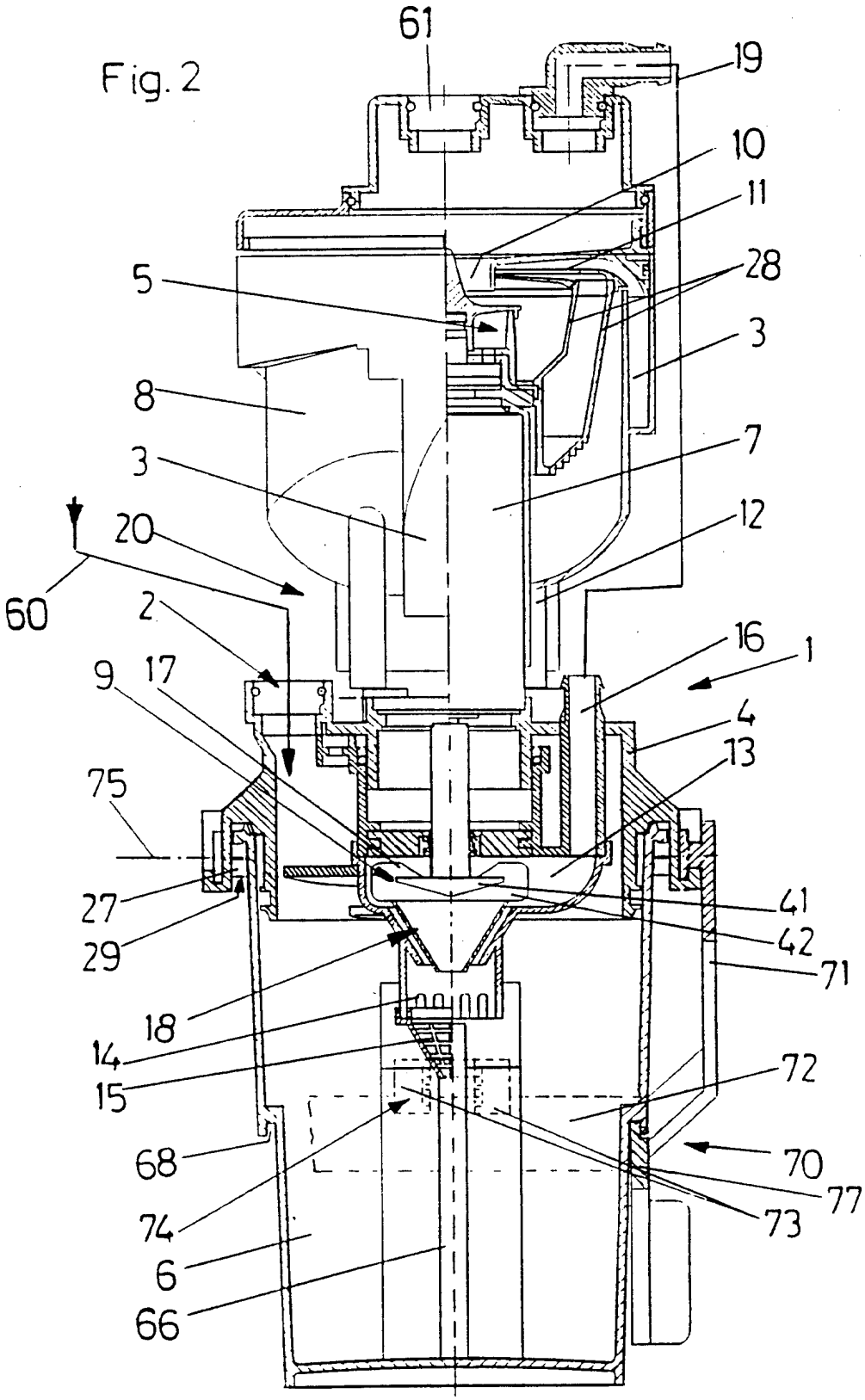
Fig. 2



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INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/AT 93/00199

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 A61C17/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 432 142 (TRAWÖGER) 12 June 1991 cited in the application see abstract; figure 1	1-3
Y	WO,A,92 18062 (TRAWÖGER) 29 October 1992 see the whole document	1-3
A	EP,A,0 400 431 (DÜRR DENTAL) 5 December 1990 see claim 1; figures 1,2,4	1
A	EP,A,0 300 439 (DÜRR DENTAL) 25 January 1989 see abstract; figures 1,2	1

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

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Date of the actual completion of the international search	Date of mailing of the international search report
14 April 1994	22.04.94

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Kousouretas, I

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat Application No
PCT/AT 93/00199

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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		AU-A-	5311886	22-07-86
		CA-A-	1293455	24-12-91
		DE-A-	3584636	12-12-91
		DE-U-	8536837	10-12-87
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		DE-D-	3885524	16-12-93

INTERNATIONALER RECHERCHENBERICHT

Intern ales Aktenzeichen
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IPK 5 A61C17/06

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IPK 5 A61C

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Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie°	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
Y	EP,A,0 432 142 (TRAWÖGER) 12. Juni 1991 in der Anmeldung erwähnt siehe Zusammenfassung; Abbildung 1	1-3
Y	WO,A,92 18062 (TRAWÖGER) 29. Oktober 1992 siehe das ganze Dokument	1-3
A	EP,A,0 400 431 (DÜRR DENTAL) 5. Dezember 1990 siehe Anspruch 1; Abbildungen 1,2,4	1
A	EP,A,0 300 439 (DÜRR DENTAL) 25. Januar 1989 siehe Zusammenfassung; Abbildungen 1,2	1

☐ Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen

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14. April 1994	22. 04. 94

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Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Kousouretas, I

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INTERNATIONALER RECHERCHENBERICHT

Angaben zu Veröffentlichungen, die zur selben Patentfamilie gehören

Internat ...s Aktenzeichen
PCT/AT 93/00199

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie		Datum der Veröffentlichung
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		AU-A-	5311886	22-07-86
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EP-A-0300439	25-01-89	DE-A-	3724247	02-02-89
		DE-D-	3885524	16-12-93

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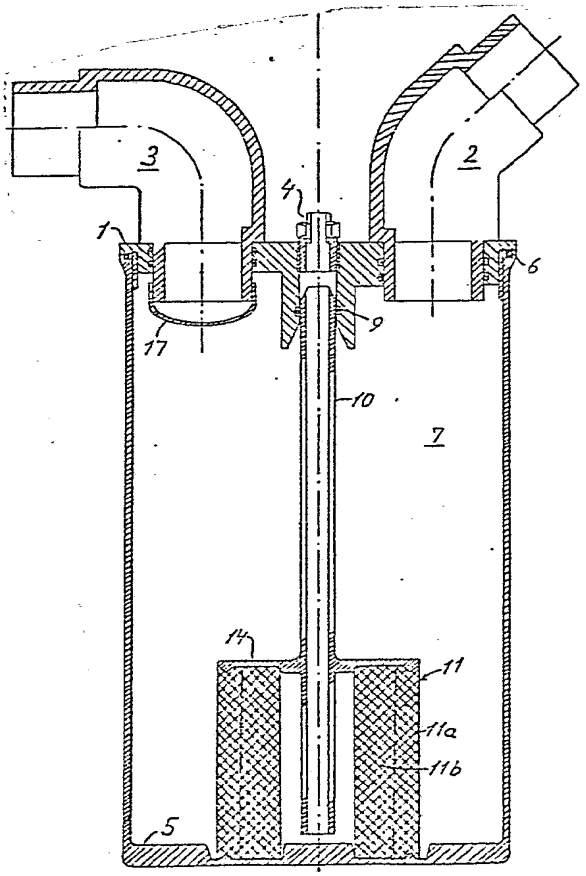
(54) Title: A DEVICE FOR SEPARATING WASTE PRODUCTS FROM A FLOW OF LIQUID AND GAS

(57) Abstract

The apparatus, which is designed for collection of mercury waste products and other waste products which are sucked from a rinse basin or by a mouth suction device at a dental clinic, has a head (1) which is stationary at the dentist's chair, and which through connections (2, 3, 4) and appertaining hoses are connected permanently to the rinse basin, a suction source, and an injector or suction pump respectively which, from the bottom of a tank (7) under the head (1), can suck filtered water to a sewer. Impurities are separated from the air current under its strong change of direciton and possibly by passage through a sieve (17) or a filter. At the bottom of the tank there is a filter cartridge (11) separating waste products from the liquid which from the outside of the cartridge is drawn through it and up through a suction tube (10). The apparatus can be used with different kinds of filter cartridges (11) and with screens (17) selected as required or filter cartridges at the connection (3) and possibly also at the connection (2). It ensures effective separation of cleaned air, liquid, andimpurities and allows active suction of cleaned liquid by the use of a small liquid tank placed close to the source of pollution.



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A Device for Separating Waste Products from a Flow of Liquid and Gas.

The invention relates to an apparatus for separation of waste products from a flow of liquid and gas, e.g. at dental clinics or photographic establishments, and of the kind which has a tank the inner space of which is connected at its upper end to at least one inlet connection for sucked-in liquid and gas, and to an outlet connection for evacuated gas, while the lower end of the space is connected to a discharge connection for liquid.

Because of the ever growing efforts to avoid pollution of the environment, there is a great need for a simple way of trapping toxic and/or costly waste products carried along in a flow of liquid and gas such as is the case at e.g. dental clinics where liquid and gas are sucked from a rinse basin and/or a mouth suction device into a fixed separation tank, or in some cases into a detachable collecting tank from which the liquid is carried on to a drain after waste products have been separated by sedimentation.

However, cleaning of the apparatuses and collection and dispatch of the waste products are unpleasant and risky work, and endeavours have, therefore, been made to show many different solutions to the related problems.

From the description of DK-PS No. 138,927 a dental apparatus of the said kind is known which, for the purpose of facilitating cleaning work, has a removable liquid collecting tank. Furthermore, the apparatus has a removable sieve for detention of solids in the liquid sucked from the patient's mouth, and this sieve can also be removed and cleaned.

Cleaning of this apparatus as well as of the other known apparatuses where the discharge line is connected to a separation tank is, however, still rather unpleasant work which may involve a certain risk of infection. Besides, these known apparatuses are not built up so that they

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can be arranged in a simple and cheap way for removal of the waste products encountered in every single case and for cleaning of the waste water to the exact extent required in the actual case.

It can be mentioned that apparatuses are also known in which air, liquid, and waste products are sucked through a cyclone where air and liquid are separated whereafter solids in the liquid are deposited in a disposable tank which can be removed and closed with a lid. It is, however, impossible by the use of a cyclone to obtain effective separation of the smallest waste particles, including finely ground amalgam, e.g. sludge from drilling of teeth, and the method is relatively expensive. Furthermore, it is rather difficult to clean the cyclone, and the apparatus is unsuitable in connection with ejector suction devices and rinse fountains of old types.

It is the object of the present invention to show an apparatus of the said kind which, even if it is of a simple design, renders the unpleasant cleaning of separation tanks now required superfluous and which can give a more effective and safe separation and collection of waste products than corresponding known apparatuses, and an apparatus with a great flexibility as regards degree of cleaning and the kind of waste products.

The apparatus according to the invention is characteristic in that inlet connection, outlet connection, and discharge connection for liquid are placed on a common head which has devices for tight-fitting connection to the mouth rim of the tank wall, and in that the interior of a filter cartridge placed in the lower part of the tank space, is connected to the discharge connection for liquid through a suction tube.

In such an apparatus the polluting substances can be removed effectively in the tank, i.e. as close to the pollution source as possible, which is an obvious advantage. Among other things, cleaning of the air line system from suction device to separation tank is made superfluous, and

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gradual reduction of the air suction capacity is thus also avoided. The tank with collected waste products can easily be designed so that it can be removed from the head, sealed, and sent to a regeneration or destruction plant without inconvenience to the personnel. The filter cartridge employed can be adapted to the kind of waste particles and to the degree of cleaning required, and the same applies to a sieve or filter cartridge which can easily be placed in front of the outlet connection where the gas flows away from the tank. This flexibility has the effect that not only is the apparatus suitable for use at dental clinics, but also in other enterprises and for separation of many different substances such as amalgam, mercury, and particles or chips of e.g. silver and gold as well as fine-grained sludge from grinding and drilling processes of many kinds.

A very effective separation between cleaned air, cleaned liquid, and impurities can also according to the invention be obtained by the tank containing an interchangeable sieve placed between the mouth of the head inlet connection for liquid and gas and the outlet connection for gas and which extends towards the tank bottom.

The air is cleaned effectively of impurities, partly during passage through the sieve and partly by the strong deflection of the air flow between the inlet connection and the outlet connection, and the liquid is cleaned effectively both by sedimentation and by filtration through the filter cartridge, whose fraction is not disturbed by air carried along in the liquid.

The screen can, according to the invention, be a tube which is open at both ends and placed under the suction connection of the head. Hence the pressure drop through the sieve is reduced, and it is subjected to a certain self-cleaning effect.

However, the sieve can also, according to the invention, be a bag under the inlet connection of the head so that additional filtration is obtained.

Even if a tubular or a bag-shaped sieve is prefer-

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ed, the tank may, however, also be designed with a sieve wall extending from the head and towards the bottom and separating the inlet connection for liquid and gas from the outlet connection to the vacuum source. It will thus be seen that there are many possible ways of varying the degree of cleaning of both liquid and gas. The tank can in a known way be equipped with level control devices which, e.g. by the use of electrodes, start liquid suction through the discharge connection when the liquid in the tank has reached a certain level. Alternatively, liquid suction can be controlled electrically in connection with the control system for the air suction motor or with a manually operated electric switch.

The necessary seals can easily be provided by O-rings or in a similar way, and the tank can be fixed to the circumference by an axial flange on the head by means of a snap lock mechanism or a threaded section.

According to the invention the tank can form an interchangeable disposable tank which immediately under the head has a cover with openings which are flush with the openings in the head connections, since the discharge connection for liquid is arranged as a tight-fitting releasable connection to the suction tube from the filter cartridge passing through the cover. Such a tank can, without risk of pollution and infection owing to spillage, be removed easily from the permanent head at a dentist's chair.

Normally, it will, however, suffice to use a tank open at the top, since the tank is only open during replacement, and replacement of filter cartridge and sieves will in some cases not be necessary whenever the tank is replaced. Besides, it has appeared that the toxins introduced in the tank during ordinary dental treatment kill bacteria to such an extent that even after lengthy standing the contents of the tank will emit no obnoxious smell which may render replacement work unpleasant.

The invention is explained in greater detail in the following in connection with the drawing where

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Figure 1 shows an axial section through a first embodiment of the tank according to the invention, and

Figure 2 shows an axial section through another embodiment of the tank according to the invention.

Figure 1 shows a preferred simple embodiment of the apparatus according to the invention. The apparatus shown has a head 1 which can be fixed to or at a dentist's chair and which has through-going bores with appertaining connections, viz. one or more inlet connections 2 which via hose connections can be connected to a rinse basin and a mouth suction device, an outlet connection 3 which can be connected to a vacuum source, and a discharge connection 4 which can be connected to an injector or suction pump for suction of filtered water to a sewer or possibly to a collecting tank. The connection 2 can be equiped with branch connections for connection to rinse basin and mouth suction device respectively, or either of these sources of pollution can be connected to a separate connection 2 in the head.

A tank 7 with a closed bottom 5 has a gasket 6 in its mouth rim facing upwards, by means of which gasket it closes tightly against the head 1 to which it is fixed, for example, by a threaded section or a snap lock 8 (Fig. 2) or in another suiable way. For example, the tank can be a cup of elastic material with a rim which can be snapped over a bead on an axial flange of the head 1.

The upper end of a suction tube 10 is fixed to the head under the discharge connection 4 by means of a seal ring 9, and this tube almost reaches the tank bottom where it is surrounded by a filter cartridge 11 which is in close contact with the tank bottom 5. For example, the filter cartridge 11 can be glued to the bottom or fixed to it in some other suitable way as indicated in Figure 2. Tightness can also be obtained with an O-ring 12. The filter cartridge is tightly connected to the suction pipe 10 through a jacket 14.

However, the filter cartridge can also simply be

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closed at the bottom, or it can be ensured in some other way that there is only connection between the outer and inner sides of the cartridge through the filter element. The liquid which flows from the inlet connection 2 to the bottom of the tank, and which from the discharge connection 4 is sucked up through the tube 10, can be cleaned more or less depending on the pores of the filter cartridge 11. As indicated in Figure 1, it can be divided into a coarse filter 11a and an inner filter 11b with finer pores so that clogging up of the filter is delayed which is important since a filter cartridge with a pore size sufficient for obtainment of the filtration fineness yielded by the apparatus according to the invention, is clogged up on the surface very soon unless, like in an embodiment according to the invention, it is surrounded by a cartridge with a larger pore size which provides a certain volume for absorption of the large particles, which thus delay clogging up of the inner cartridge.

The air which enters through connection 2 and is sucked off through connection 3, is cleaned of impurities by the strong deflection in the tank and, if desired, by passage of a sieve 17 or a filter placed under the outlet connection 3. The mesh size of this sieve, or the filter, can also be varied with due regard to the kind of waste products and the degree of cleaning required.

The embodiment of the apparatus according to the invention shown in Figure 2 differs from the embodiment described above by a suspended tubular sieve being mounted in close connection with the lower side of the head 1, which sieve can detain waste products from the liquid-gas mixture entering through inlet connection 2.

To prepare the apparatus for operation, the tank 7 is placed under the stationary head 1 whose connections are connected permanently to a rinse basin, a vacuum suction source, and an injector or suction pump respectively.

During its use, air, mucus, water, and impurities are sucked in through the inlet connection 2. Impurities

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are separated off in the sieve 13 and/or by the strong change in the air direction, before it flows to the suction source through connection 3 while the liquid flows to the bottom of the tank, and waste products such as amalgam waste are filtered off by the filter cartridge 11 before the liquid is drawn up through suction tube 10.

By means of an electrode 16 or a corresponding detection device such as a probe extending into the tank, or by electric control in connection with the air suction motor, it is ensured that the liquid in the tank 7 does not rise above a prefixed level 15 since the liquid suction through the discharge connection 4 is started when the liquid surface has risen to this level. The tank filled with waste is separated from the lid 1 by the snap lock mechanism 8 and is closed with an appertaining tight-fitting lid and sent to a plant where its contents are destroyed and/or recovered. It will be understood that the apparatus with head 1 and filter cartridge 11 and a sieve 17, 13 if any, and an appertaining tank 7 can be made at a relatively low price and can work without replacement for a prolonged period. Furthermore, the apparatus according to the invention is suitable for use in connection with most existing suction apparatuses at dental clinics.

The apparatus according to the invention can be made in many other ways than the one described in the foregoing. For example, as shown in dotted lines in Figure 2, a fixed tight-fitting cover 9 with openings flush with the bores of the head 1 for connections 2, 3, 4 can be placed at the top of the collecting tank 7. In that case the screen 13 and possibly also the suction tube 10 can be fixed to the cover 9 so that they are removed together with the collecting tank.

However, the tank can also be designed with a removable cover 9 and an interchangeable filter 13 placed on it. In either of the embodiments shown the filter cartridge 11 and the jacket 14 can be arranged for replacement on the suction tube 10.

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It can be seen that the invention has produced a cleaning-convenient apparatus of a simple design and usable for safe collection of waste products of many different kinds, including especially the very smallest particles in the waste which it has hitherto been impossible to detain to the same degree. It is thus assumed that at least 98% of liquid-suspended particles of the size 0.3 µ or larger can be caught in the filter cartridge 11, and that 99.95% of particles in the suction air of a size larger than 0.2 µ can be detained in a corresponding filter cartridge 17 in front of the outlet connection 3. The apparatus can easily be arranged individually for the degree of cleaning wanted or required in every single case.

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Patent Claims:

1. An apparatus for separation of waste products from a flow of liquid and gas e.g. at dental clinics or photographic establishments, and of the kind which has a tank (7), the inner space of which is connected at its upper end to at least one inlet connection (2) for sucked-in liquid and gas, and with an outlet connection (3) for evacuated gas, while the lower end of the space is connected to a discharge connection for liquid, c h a r a c t e r i z e d in that the inlet connection (2), the outlet connection (3), and the discharge connection (4) for liquid are placed on a common head (1) with devices (8) for tight-fitting connection with the mouth rim of the tank wall, and in that the interior of a filter cartridge (11) placed in the lower part of the tank space is connected via a suction tube (10) to the discharge connection (4) for liquid.

2. An apparatus as claimed in claim 1, c h a r a c t e r i z e d in that a filter sieve (17) or a filter cartridge is placed under the outlet connection (3) for gas of head (1).

3. An apparatus as claimed in claims 1-2, c h a r a c t e r i z e d in that the filter cartridge (11) is tubular and that the extreme end of the tube wall forms a coarse filter (11a) while the inner part of the wall consists of a material (11b) with finer pores.

4. An apparatus as claimed in each of the preceding claims, c h a r a c t e r i z e d in that the tank (7) contains an interchangeable sieve (13) placed between the mouth of the inlet connection (2) of head (1) for liquid and gas and the outlet connection (3) for gas and which extends towards the bottom of the tank (7).

5. An apparatus as claimed in claim 4, c h a r a c t e r i z e d in that the sieve (13) is a tube which is open at both ends and placed under the inlet connection (2) of head (1).

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6. An apparatus as claimed in claim 4, c h a r a c t e r i z e d in that the sieve (13) is a bag under the inlet connection (2) of head (1).

7. An apparatus as claimed in each of the preceding claims, c h a r a c t e r i z e d in that the collecting tank (7) is fixed to the circumference of an axial flange on head (1) by the use of a snap lock mechanism (8) or a threaded section.

8. An apparatus as claimed in each of the preceding claims, c h a r a c t e r i z e d in that the filter cartridge (11) is interchangeable on the suction tube (10).

9. An apparatus as claimed in each of the preceding claims, c h a r a c t e r i z e d in that the suction tube (10) from the filter cartridge (11) is releasably connected to head (1).

10. An apparatus as claimed in each of the preceding claims, c h a r a c t e r i z e d in that the tank (7) forms an interchangeable disposable tank which immediately under the head (1) has a cover (9) with openings flush with the openings in the connections (2, 3, 4) of the head and that the discharge connection (4) for liquid is arranged for a tight-fitting releasable connection with the suction tube (10) passing through the cover from the filter cartridge (11).

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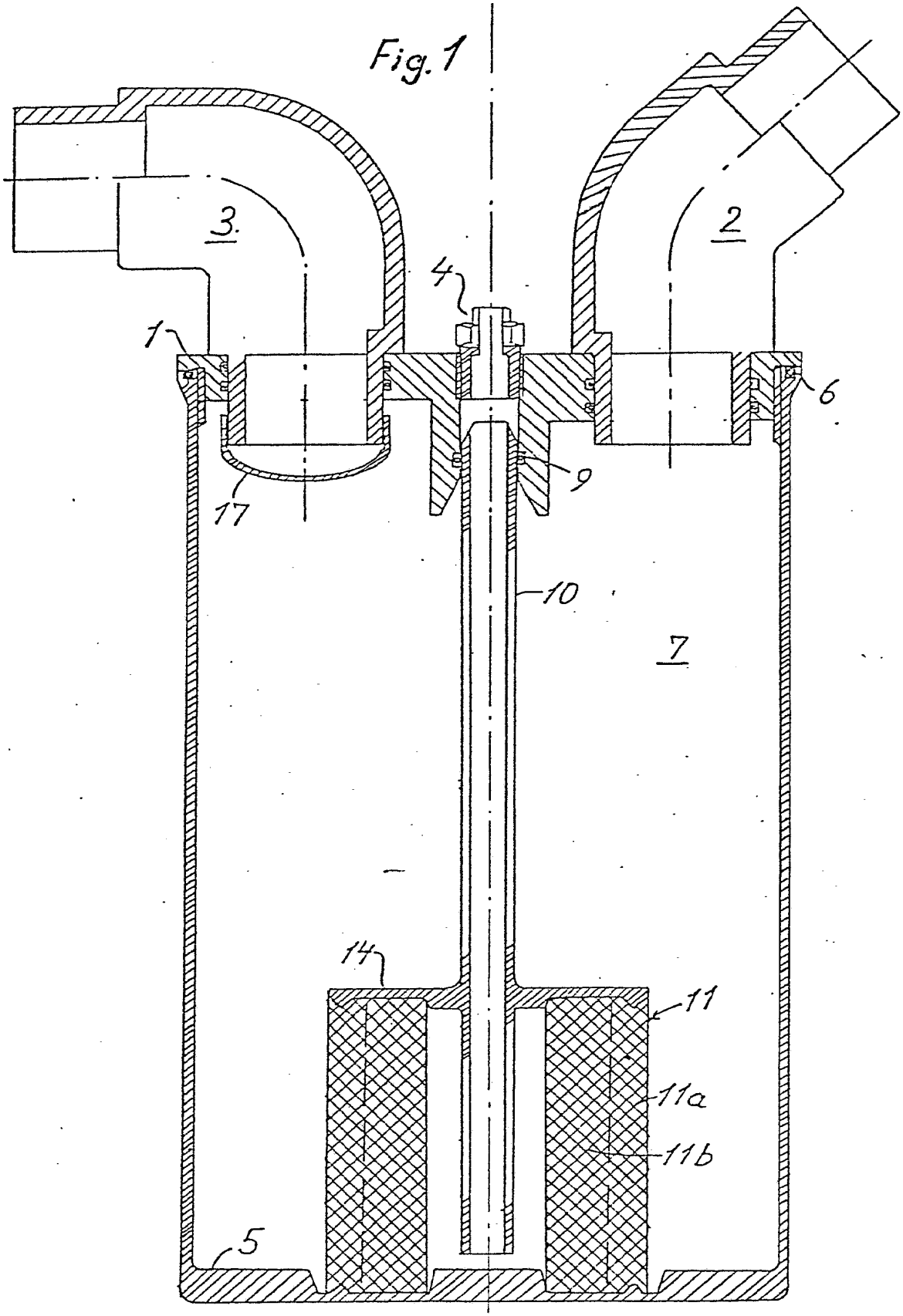
Fig. 1



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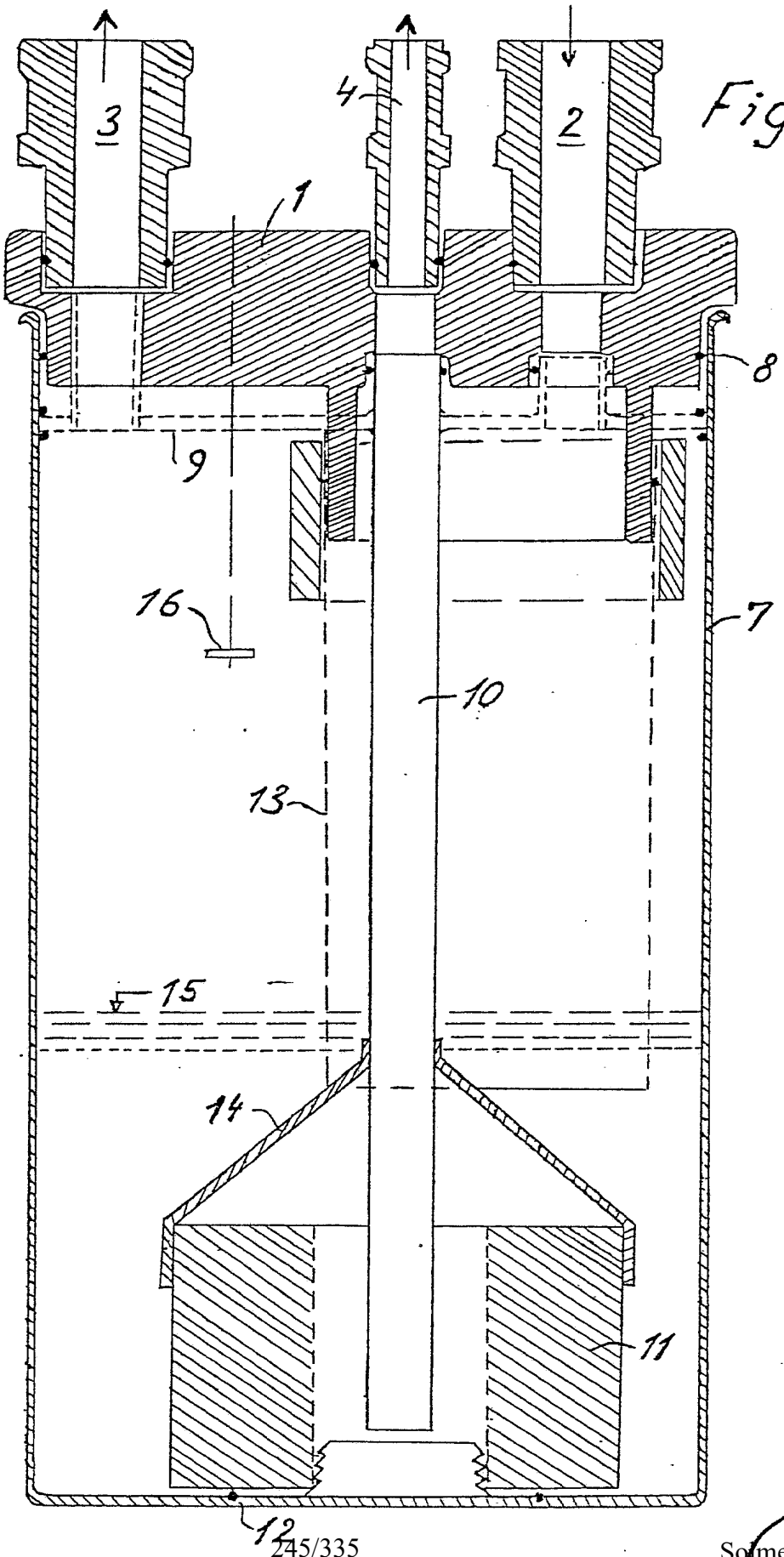

Fig. 2

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INTERNATIONAL SEARCH REPORT

International Application No PCT/DK83/00011

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC 3

A 61 C 17/04, B 01 D 35/02, G 03 C 11/24

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC 3	A 61 C 17/04, A 61 M 1/00, B 01 D 27/04,08, G 03 C 11/24, B 01 D 35/02
US Cl	32:33; 210:311, 406, 416, 422-423, 435-438, 459-460

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [5]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	DE, B2, 2 459 881 (SIEMENS AG) 24 June 1976 & DK, C, 138 927	
Y	DE, A1, 2 934 915 (LANG) 19 March 1981	
Y	GB, A , 1 299 677 (PENNWALT CORP) 2 August 1971	
Y	US, A , 3 482 313 (STRAM) 9 December 1969	
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A	SE, B , 333 249 (EASTMAN KODAK COMPANY) 1 July 1968	

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [1]	Date of Mailing of this International Search Report [1]
1983-05-11	1983 -05- 20
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Swedish Patent Office	Johan Auby

Form PCT/ISA/210 (second sheet) (October 1981)

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Electronic Patent Application Fee Transmittal

Application Number:	15730828
Filing Date:	12-Oct-2017
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**120**

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Electronic Acknowledgement Receipt

EFS ID:	33849824
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	27-SEP-2018
Filing Date:	12-OCT-2017
Time Stamp:	14:58:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$120
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File Listing:

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Warnings:					
Information:					
2	Foreign Reference	EP1366728B1.pdf	594424 6aed41c09d751c45f66816ccd62056a42997698f	no	11
Warnings:					
Information:					
3	Foreign Reference	CA2442513A1.pdf	523628 32fd13e4377aa63756e3d7390ef0f584d7ccb087	no	13
Warnings:					
Information:					
4	Foreign Reference	WO2018006106A1.pdf	515694 97e37d218865e687953eaef8dc5ece4d649156b9	no	17
Warnings:					
Information:					
5	Foreign Reference	WO9416643A1.pdf	646991 4d9f3a2f557e041786392421f2cd7c71e434832c	no	15
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6	Foreign Reference	WO8302720A1.pdf	776796 92260c677d0772cab2f0ec85d158059da5ac716f	no	15
Warnings:					
Information:					

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7	Fee Worksheet (SB06)	fee-info.pdf	30192 3c0e4c0a44c1fd6989970b67b8cade268bbc509a	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	3700896

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US	9884

80709 7590 07/26/2018

Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

EXAMINER	
LUCCHESI, NICHOLAS D	

ART UNIT	PAPER NUMBER
3732	

NOTIFICATION DATE	DELIVERY MODE
07/26/2018	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):

srlpatents@aol.com

Office Action Summary	Application No. 15/730,828	Applicant(s) MOZZICATO ET AL.	
	Examiner NICHOLAS LUCCHESI	Art Unit 3732	AIA (First Inventor to File) Status Yes

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *10/12/17*.

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

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

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

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

Disposition of Claims*

5)☒ Claim(s) *1-12* is/are pending in the application.

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

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-12* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

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The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-12 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

In claim 1, lines 4 and 5 are unclear. These lines recite that the suctioning device is in fluid communication with the tank inlet. However, in the preamble of the claim, the suctioning device is only functionally recited. Thus, it is unclear if applicant is intending to positively claim the suctioning device. For purposes of this action, the examiner will assume that the suctioning device is being positively claimed.

In claim 2, line 2 appears to be incomplete.

In claim 4, line 2, "said shipping cap" has no prior antecedent basis.

In claim 5, line 2, "said shipping cap" has no prior antecedent basis.

Claim 7, line 2, “said shipping cap” is unclear. This claim recites that the shipping cap is holding the two plugs in place. However, claim 6 only recites the shipping cap

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functionally. Thus, it is unclear if the shipping cap is being positively claimed. For purposes of this action, it will be assumed that the shipping cap is being positively claimed.

In claim 11, lines 2 and 3, "its outside top mating surface" has no prior antecedent basis.

In claim 11, lines 3 and 4, "its mating surface" has no prior antecedent basis.

In claim 12, lines 2 and 3, "its outside top mating surface" has no prior antecedent basis.

In claim 12, lines 3 and 4, "its mating surface" has no prior antecedent basis.

The following is a quotation of 35 U.S.C. 112(d):

> (d) REFERENCE IN DEPENDENT FORMS.—Subject to subsection (e), a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

The following is a quotation of pre-AIA 35 U.S.C. 112, fourth paragraph:

> Subject to the following paragraph [i.e., the fifth paragraph of pre-AIA 35 U.S.C. 112], a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

Claim 9 is rejected under 35 U.S.C. 112(d) or pre-AIA 35 U.S.C. 112, 4th paragraph, as being of improper dependent form for failing to further limit the subject matter of the claim upon which it depends, or for failing to include all the limitations of the claim upon which it depends.

Claim 9 depends from claim 1, but fails to further limit the recycling system recited in claim 1.

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Applicant may cancel the claim(s), amend the claim(s) to place the claim(s) in proper dependent form, rewrite the claim(s) in independent form, or present a sufficient showing that the dependent claim(s) complies with the statutory requirements.

Claim Rejections - 35 USC § 102

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

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

Claim 6 is rejected under 35 U.S.C. 102(a)(1) as being anticipated by Erickson ‘769.

With regard to claim 6, Erickson teaches a dental amalgam recycling container (see columns 7 and 8 which discuss recycling of heavy metals) comprising threads for attachment of a shipping cap (Fig 2). See column 7, lines 11-13 which discuss sealing the jar with a cap (lid) 14 for transport.

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Claims 9 and 10 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Hubner et al '052.

Hubner et al disclose a separator system, which includes an adaptor 90, 100 that enables a recycling container 52 to be connected to a separator tank. Note that each adaptor is unthreaded, and has different diameters on either end. Thus, it is clear that, due to the different sizes of the diameters of the adaptors 90, 100, such adaptors of Hubner et al could be used to attach any separator tank to any recycling container. It is noted that instant claim 9 only requires that the adaptor "enables" a recycling tank to be capable of being connected to the separator tank of claim 1 (the separator tank of claim 1 is only functionally recited in instant claim 9).

Claim Rejections - 35 USC § 103

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

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 7 and 8 are rejected under 35 U.S.C. 103 as being unpatentable over Erickson ‘769.

With regard to claim 7, Erickson discloses a stop 15 (column 6, lines 23-24) and an O-ring 2 (see col 5, line 58).

Erickson does not specify two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks.

It would have been obvious to one of ordinary skill in the art to utilize plugs (stops) held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks, in order to provide a better seal for the container to prevent leaking of the cap during the shipping process. Note that Erickson does contemplate the use of a plug (stop) and o-ring for sealing purposes.

With regard to claim 8, note that Erickson discloses a two tier cover (Fig 1)

While Erickson does not specify a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal, it would have been obvious to one of ordinary skill in the art to use a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal, in order to improve the seal of the container for shipping.

Claims 1-5 are rejected under 35 U.S.C. 103 as being unpatentable over Darcy et al ‘074 (“Darcy") in view of Erickson ‘769.

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With regard to claim 1, Darcy discloses a dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device (see paragraph 19) comprising:

(a) an air-water separator tank for receiving the effluent (see paragraph 32), said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device, an air-water separator tank liquid effluent outlet (see paragraphs 31 and 37) and an air-water separator tank air outlet 20';

(b) a detachable recycling container 26, said recycling container acting primarily under the influence of gravity to cause settlement of said particles (see paragraph 41); said recycling container having a recycling container effluent inlet port 48 connected to said air-water separator tank liquid effluent outlet 46; and said recycling container further having an effluent outlet port 20;

(c) wherein the air-water separator tank also includes an internal suction conduit 60;

(d) wherein the recycling container comprises a mechanical connection 23 (see paragraph 33);

(e) wherein the recycling container 26, effluent inlet port 48, and the recycling container outlet port 56 are not the same height. See figure 1 which shows 48 and 56 at different heights.

Darcy does not disclose where the recycling container comprises threads.

Erickson discloses wherein the recycling container comprises threads 17. See column 6.

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It would have been obvious to one of ordinary skill in the art to modify to provide threads on the collection tank of Darcy, as taught by Erickson, if one wished to provide for easy separation and removal of the collection tank.

With regard to claim 2, Darcy/Erickson discloses the dental amalgam recycling system of claim 1. Further, Erickson discloses a threaded shipping cap for said recycling container (see figure 2 and column 7).

With regard to claim 3, Darcy/Erickson disclose the dental amalgam recycling system according to claim 1. Further, Erickson discloses a lid 14 (col 7, lines 11-13) and a plug 15 (stop). While Darcy/ Erickson do not specify further comprising a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port, it would have been obvious to one of ordinary skill in the art to use a plug to close both the inlet port and outlet port to provide additional seal to the recycling container of Darcy/Erickson.

With regard to claim 4, Darcy/Erickson disclose the dental amalgam recycling system according to claim 3. While Darcy/Erickson do not specify wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place, it would have been obvious to one of ordinary skill in the art to use the threaded shipping lid to hold the first and second plugs in place in order to provide an additional seal in order to insure that potentially hazardous material is not released.

With regard to claim 5, Darcy/Erickson disclose the dental amalgam recycling system according to claim 4. Further, Darcy discloses an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place. See paragraph 33 of Darcy.

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Allowable Subject Matter

Claims 11 and 12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICHOLAS LUCCHESI whose telephone number is (571)272-4977. The examiner can normally be reached on M-F 7:30-5:00 1st Fri Off.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cris Rodriguez can be reached on 571-272-4964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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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.

/NICHOLAS LUCCHESI/
Primary Examiner, Art Unit 3732

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Notice of References Cited	Application/Control No. 15/730,828	Applicant(s)/Patent Under Reexamination MOZZICATO ET AL.	
	Examiner NICHOLAS LUCCHESI	Art Unit 3732	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-54,414 A	05-1866	Name not available	B01D11/043	210/511
*	B	US-1,032,879 A	07-1912	Name not available	B60H1/00485	137/559
*	C	US-2,467,547 A	04-1949	BIRNBAUM SAMUEL L	E03C1/284	210/532.1
*	D	US-4,326,952 A	04-1982	Blake; Gene J.	A61C17/046	210/243
*	E	US-4,385,891 A	05-1983	Ligotti; Eugene F.	A61C17/046	210/249
*	F	US-4,599,170 A	07-1986	Friedman; Denis R.	B01D29/05	210/223
*	G	US-4,761,235 A	08-1988	Haentjens; Kathleen S.	E03C1/266	210/532.1
*	H	US-4,957,621 A	09-1990	Rohloff; Pete	B01D21/0003	210/171
*	I	US-5,114,578 A	05-1992	Sundstrom; Gustaf F.	A61C17/046	210/256
*	J	US-5,421,996 A	06-1995	Trawoger; Werner	A61C17/046	210/232
*	K	US-5,484,282 A	01-1996	Trawoger; Werner	A61C17/046	433/92
*	L	US-6,149,812 A	11-2000	Erickson; Roger T.	A61C17/046	210/521
*	M	US-6,409,803 B1	06-2002	Tremel; James D.	B01D45/12	433/92

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

Notice of References Cited	Application/Control No. 15/730,828	Applicant(s)/Patent Under Reexamination MOZZICATO ET AL.	
	Examiner NICHOLAS LUCCHESI	Art Unit 3732	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2003/0003417 A1	01-2003	Hubner, Henry	A61C17/046	433/92
*	B	US-6,592,769 B1	07-2003	Erickson; Roger T.	A61C17/046	210/521
*	C	US-2004/0259052 A1	12-2004	Hubner, Henry	A61C17/046	433/92
*	D	US-7,156,214 B2	01-2007	Pradel; Robert	F16F9/466	188/300
*	E	US-7,182,599 B2	02-2007	Stone; Mark E.	A61C17/046	210/420
*	F	US-2010/0264074 A1	10-2010	Darcy; Michael J.	B01D19/0042	210/151
*	G	US-8,393,898 B2	03-2013	McCary; Charles	A61C17/046	210/446
*	H	US-9,332,969 B2	05-2016	Han; Steve	A61B10/0096	1/1
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

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	N					
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NON-PATENT DOCUMENTS

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

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15730828	MOZZICATO ET AL.
	Examiner	Art Unit
	NICHOLAS LUCCHESI	3732

CPC- SEARCHED		
Symbol	Date	Examiner
A61C 17/046, 17/14, 5/66, 2202/00: B01D 17/00, 21/0006, 21/0012, 21/0018	7/21/2018	NL

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Search	7/21/2018	NL

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

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	161	A61C17/04\6.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L2	141	A61C17/14.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L3	320	A61C5/66.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L4	225	A61C2202/00.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L5	917	B01D17/00.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L6	0	B01D21/0006cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L7	518	B01D21/0006.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L8	1304	B01D21/0012.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L9	446	B01D21/0018.cpc.	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L10	3563	L1 or L2 or L3 or L4 or L5 or L6 or L7 or L8 or L9	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L11	57	L10 and dental and amalgam and separator	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L12	23	L11 and (recycle or recycling)	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L13	14	L12 and (cap or lid)	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L14	3	L13 and (threads or threaded)	US-PGPUB; USPAT	OR	OFF	2018/07/21 15:57
L15	1	"7156214".pn.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:02
L16	1	"6409803".pn.	US-PGPUB;	OR	OFF	2018/07/21 16:02

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			USPAT			
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L18	1	"6592769".pn.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:04
L19	1	"20100264074".pn.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:05
L21	14	("0054414" | "1032879" | "2467547" | "4326952" | "4385891" | "4761235" | "4957621" | "5114578").PN. OR ("6592769").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/21 16:06
L22	1	mozzicato adj2 nicholas.in.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:08
L23	2	goulston adj2 richard.in.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:09
L24	1	schofield adj2 robin.in.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:09
L26	3	toole adj2 michael.in.	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:09
L27	9	dental and amalgam and separator and adaptor	US-PGPUB; USPAT	OR	OFF	2018/07/21 16:19

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Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

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
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US

CONFIRMATION NO. 9884

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

PUBLICATION NOTICE

OC00000098741910

Title: Dental Amalgam Separation and Recycling System

Publication No.US-2018-0098831-A1
Publication Date:04/12/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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

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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/730,828	10/12/2017	1778	800	SMTX-001-US	12	2

CONFIRMATION NO. 9884

UPDATED FILING RECEIPT

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

OC000000098261537

Date Mailed: 12/26/2017

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

Inventor(s)

Nicholas Mozzicato, Acton, MA;
Richard Goulston, Stuart, MA;
Robin Schofield, Lancaster, MA;
Michael Toole, Norton, MA;

Applicant(s)

Solmetex LLC, Northbridge, MA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/406,990 10/12/2016
and claims benefit of 62/414,712 10/29/2016

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

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

If Required, Foreign Filing License Granted: 10/25/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/730,828**

Projected Publication Date: 04/12/2018

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

Dental Amalgam Separation and Recycling System

Preliminary Class

210

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

SelectUSA

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 U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/730,828

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	12 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: TBA
MOZZICATTO	)	
	:	Group Art Unit TBA
Application No.: 15/730,828	)	
	:	Confirmation No. 9884
Filed: October 12, 2017	)	
	:	
For: DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM	)	
	:	

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

RESPONSE TO NOTICE TO FILE MISSING PARTS

Sir:

In response to the Notice to File Missing Parts, mailed on October 27, 2017, Applicant responds as follows:

1. Applicant submits herewith the $730.00 non-provisional patent filing fee, search fee and examination fee, (small entity), and the small entity surcharge in the amount of $70.00.
2. Applicant submits herewith the signed declarations of the inventors.
3. Applicant claims small entity status under 37 C.F.R. §1.27.
4. Remarks begin on page 2.

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DRNA v. Solmetex - PGR2023-00555

REMARKS

Applicant submits this response to the Notice to File Missing Parts, which was mailed on October 27, 2017.

With the submission of the signed declarations of all four co-inventors: Nicholas Mozzicato; Richard Goulston; Robin Schofield; and Michael Toole; together with the appropriate small entity non-provisional patent filing, search and examination fees, and the small entity surcharge, it is believed that all requirements for this provisional patent application have been satisfied.

Applicant hereby claims small entity status under 37 CFR §1.27. If any additional fees are due, the Examiner is requested to contact Applicants' undersigned representative.

Applicant's undersigned representative may be reached by telephone at 617-966-2374. All correspondence should continue to be directed to the listed address.

Respectfully submitted,

/Steven R. Lazar/

Steven R. Lazar
Attorney for Applicants
Registration No. 32,618

SRL Patents
234 Broadway
Arlington, MA 02474
December 20, 2017

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Dental Amalgam Separation and Recycling System

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15730828

filed on October 12, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Nicholas Mozzicato Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

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LEGAL NAME OF INVENTOR

Inventor: Richard Goulston Date (Optional): 12/18/2017

Signature: Richard Goulston

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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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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.

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The above-identified application was made or authorized to be made by me.

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LEGAL NAME OF INVENTOR

Inventor: Robin Schofield Date (Optional): 12/14/2017

Signature: Robin B. Schofield

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

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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.

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PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Dental Amalgam Separation and Recycling System

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15730828

filed on October 12, 2017

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

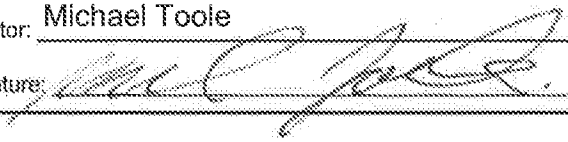
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Michael Toole Date (Optional): 12/20/17

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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 Patent Application Fee Transmittal

Application Number:	15730828
Filing Date:	12-Oct-2017
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	70	70
Petition:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**800**

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Electronic Acknowledgement Receipt

EFS ID:	31294687
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	20-DEC-2017
Filing Date:	12-OCT-2017
Time Stamp:	17:28:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$800
RAM confirmation Number	122117INTEFSW17290600
Deposit Account	
Authorized User	

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

Solmetex Ex. 2004
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	SMTX-0001-Response_10-27-2017_NTFMP.pdf	60897 8349d07ddbe85e3c850dc6532a0c303676e5e716	no	2
Warnings:					
Information:					
2	Oath or Declaration filed	Mozzicato-Dec.pdf	86594 ae0b4c5d4dfc2112251599778d3ba0b5fb0ea54c	no	1
Warnings:					
Information:					
3	Oath or Declaration filed	Goulston-Dec.pdf	257791 e0cb431532a1bac01c7e0135b4ffc1fee84d5124	no	2
Warnings:					
Information:					
4	Oath or Declaration filed	Schofield-Dec.pdf	174320 1af99ce056de349a8309db725e5ebd6fc2b1771d	no	2
Warnings:					
Information:					
5	Oath or Declaration filed	Toole-Dec.pdf	90527 179101ad7b99b197991e806f82a2b0697f17e108	no	1
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	36952 6e4b8b086cd1b89376e4ebc25262d0d9c646ff12	no	2
Warnings:					
Information:					

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Total Files Size (in bytes):	707081

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/730,828	10/12/2017	1778	0.00	SMTX-001-US	12	2

CONFIRMATION NO. 9884

FILING RECEIPT

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

OC000000095007782

Date Mailed: 10/27/2017

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

Inventor(s)

Nicholas Mozzicato, Acton, MA;
Richard Goulston, Stuart, MA;
Robin Schofield, Lancaster, MA;
Michael Toole, Norton, MA;

Applicant(s)

Solmetex LLC, Northbridge, MA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/406,990 10/12/2016
and claims benefit of 62/414,712 10/29/2016

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

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

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If Required, Foreign Filing License Granted: 10/25/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/730,828**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

Dental Amalgam Separation and Recycling System

Preliminary Class

210

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

SelectUSA

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 U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

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DRNA v. Solmetex - PGR2023-00555

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/730,828

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	12 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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DRNA v. Solmetex - PGR2023-00555

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
15/730,828	10/12/2017	Nicholas Mozzicato	SMTX-001-US

CONFIRMATION NO. 9884

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

FORMALITIES LETTER

OC00000095007783

Date Mailed: 10/27/2017

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **70** basic filing fee.
- $ **70** surcharge.
- $ **300** search fee.
- $ **360** examination fee.
- $(**0**) previous unapplied payment amount.
- $ **800** TOTAL FEE BALANCE DUE.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's

oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Nicholas Mozzicato
  Richard Goulston
  Robin Schofield
  Michael Toole

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

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**.

/hachristian/

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

CORRECTED ADS FORM

Application Number	15730828
Title of Invention	Dental Amalgam Separation and Recycling System

Inventor Information

****If no data is shown, no data has been corrected****

	Data of Record	Updated Data
Order Number	1	
Name	Nicholas Mozzicato	
Residence Information		
Residency	us-residency	
City	~~Northbridge~~	Acton
State	MA	
Country of Residence	US	
Mailing Address of Inventor		
Address 1	~~50 Bearfoot Road~~	19 Preston Way
Address 2		
City,State/Province, Postal Code	~~Northbridge MA 01532~~	Acton MA 01720
Country	US	

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

	Data of Record	Updated Data
Order Number	2	
Name	Richard Goulston	
Residence Information		
Residency	us-residency	
City	~~Northbridge~~	Stuart
State	MA	FL
Country of Residence	US	
Mailing Address of Inventor		
Address 1	~~50 Bearfoot Road~~	415 NW North River Drive
Address 2		
City,State/Province, Postal Code	~~Northbridge MA 01532~~	Stuart FL 34994
Country	US	

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

	Data of Record	Updated Data
Order Number	3	
Name	Robin Schofield	
Residence Information		
Residency	us-residency	
City	~~Northbridge~~	Lancaster
State	MA	
Country of Residence	US	
Mailing Address of Inventor		
Address 1	~~50 Bearfoot Road~~	164 Old County Road
Address 2		
City,State/Province, Postal Code	~~Northbridge MA 01532~~	Lancaster MA 01523
Country	US	

	Data of Record	Updated Data
Order Number	4	
Name	Michael Toole	

Residence Information

Residency	us-residency	
City	~~Northbridge~~	Norton
State	MA	
Country of Residence	US	

Mailing Address of Inventor

Address 1	~~50 Bearfoot Road~~	12 Bryson Drive
Address 2		
City,State/Province, Postal Code	~~Northbridge MA 01532~~	Norton MA 02766
Country	US	

Application Information

	Data of Record	Updated Data
Title of Invention	Dental Amalgam Separation and Recycling System	
Attorney Docket Number	~~SMTX-001~~	SMTX-001-US
Entity Type	~~Regular Undiscounted~~	Small

Domestic Benefit/National Stage Information

****If no data is shown, no data has been corrected****

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121,365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S. C. 119(e) or 120, and 37 CFR 1.78(a).

		Data of Record	Updated Data
	Prior Application Status		
	Application Number		
	Continuity Type		
	Prior Application Number		
	Filing Date (YYYY-MM-DD)		
	Patent Number		
	Issue Date (YYYY-MM-DD)		

Foreign Priority Information

****If no data is shown, no data has been corrected****

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

		Data of Record	Updated Data
	Application Number		
	Country		
	Filing Date		
	Access Code		

Applicant Information

****If no data is shown, no data has been corrected****
Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

	Data of Record	Updated Data
Applicant Type	PPA	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is		
Name of the Deceased or Legally Incapacitated Inventor		
Applicant is an Organization	Yes	
Name		
Organization Name	Solmetex LLC	
Address 1		50 Bearfoot Road
Address 2		
City,State/Province,Postal Code		Northborough MA 01532
Country		US
Phone Number		
Fax Number		
Email Address		

Assignee Information including Non-Applicant Assignee Information

****If no data is shown, no data has been corrected****
Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office

	Data of Record	Updated Data
Order		
Applicant is an Organization		
Name		

Organization Name		

Mailing Address

Address 1		
Address 2		
City,State/Province,Postal Code		
Country		
Phone Number		
Fax Number		
Email Address		

Signature

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Steven R. Lazar/	Registration Number	32618
First Name	Steven	Last Name	Lazar

Solmetex Ex. 2004
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Electronic Patent Application Fee Transmittal

Application Number:	15730828
Filing Date:	
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Solmetex Ex. 2004
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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**70**

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Electronic Acknowledgement Receipt

EFS ID:	30658198
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	Dental Amalgam Separation and Recycling System
First Named Inventor/Applicant Name:	
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001
Receipt Date:	14-OCT-2017
Filing Date:	
Time Stamp:	12:05:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$70
RAM confirmation Number	101617INTEFSW12050600
Deposit Account	
Authorized User	

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

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet to update/ correct info	CorrectedADS.pdf	92343 bcc7445471cf8ea8072a17d41ec0e7b5d5c31c50	no	7
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	29980 a219b305cc982dcc19aa74ce61de1de881d351da	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	122323		

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.

Solmetex Ex. 2004
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PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Nicholas		Mozzicato	

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

City	State/Province	Country of Residence
Northbridge	MA	US

Mailing Address of Inventor:

Address 1	50 Bearfoot Road
Address 2	

City	State/Province	Postal Code	Country
Northbridge	MA	01532	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Richard		Goulston	

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

City	State/Province	Country of Residence
Northbridge	MA	US

Mailing Address of Inventor:

Address 1	50 Bearfoot Road
Address 2	

City	State/Province	Postal Code	Country
Northbridge	MA	01532	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Robin		Schofield	

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

Solmetex Ex. 2004
DRNA v. Solmetex - PGR2023-00555

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

City	Northbridge	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	60 Bearfoot Road		
Address 2			
City	Northbridge	State/Province	MA
Postal Code	01532	Country	US

Inventor 4 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael		Toole	

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

City	Northbridge	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	60 Bearfoot Road		
Address 2			
City	Northbridge	State/Province	MA
Postal Code	01532	Country	US

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

Correspondence Information:

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

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

Customer Number	30709		
Email Address	srlpatents@aol.com	Add Email	Remove Email

Application Information:

Title of the Invention	Dental Amalgam Separation and Recycling System		
Attorney Docket Number	SMTX-001	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	1

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

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

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

Representative Information:

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

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	30709		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62406990	2016-10-12

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62414712	2016-10-29
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.			Add

Foreign Priority Information:

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

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

Applicant Information:

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

Applicant 1 Remove

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

Clear

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

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

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Solmetex LLC		
Mailing Address Information For Applicant:			
Address 1	60 Bearfoot Road		
Address 2			
City	Northbridge	**State/Province**	MA
Country	US	Postal Code	01532
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Steven R. Lazar/			Date (YYYY-MM-DD)	2017-10-12
First Name	Steven	Last Name	Lazar	Registration Number	32618

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMTX-001
	Application Number	
Title of Invention	Dental Amalgam Separation and Recycling System	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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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DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

FIELD OF THE INVENTION

[001] This invention relates to systems and apparatus suitable to remove particles from effluent waste, and particularly, to remove amalgam and other metallic particles and other abrasive solids from dental office suction effluent. The system also comprises a self contained recycling container to facilitate customer regulatory compliance and environmental safeguards.

BACKGROUND OF THE INVENTION

[002] Dental amalgam is a dental filling material used to fill cavities caused by tooth decay. It has been used for more than 150 years in hundreds of millions of patients around the world.

[003] Dental amalgam is a mixture of metals, consisting of liquid (elemental) mercury and a powdered alloy composed of silver, tin, and copper. Approximately 50% of dental amalgam is elemental mercury by weight. The chemical properties of elemental mercury allow it to react with and bind together the silver/copper/tin alloy particles to form an amalgam. See http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DentalProducts/DentalAmalgam/ucm171094.htm, accessed September 9, 2016.

[004] Amalgam is used less often than in the past, mostly because tooth-colored materials now can be used. However, the newer materials can't be used for all dental situations, amalgam is less costly than newer materials and it lasts longer, especially in teeth that undergo a lot of pressure and wear from chewing.

[005] Better dental health overall coupled with increased demand for more modern alternatives such as resin composite fillings (which match the tooth color), as well as public concern about the mercury content of dental amalgam, have resulted in a steady decline in dental amalgam use in developed countries, though overall amalgam use continues to rise worldwide. Stein, PS; Sullivan, J; Haubenreich, JE; Osborne, PB (2005). "Composite resin in medicine and dentistry". Journal of long-term effects of medical implants. 15 (6): 641–54. doi:10.1615/jlongtermeffmedimplants. v15.i6.70. PMID 16393132.

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[006] Although amalgams are less frequently used in developed countries for new dental fillings than in the past, amalgams continue to make up a portion of the particle component of dental office effluent mainly because of the fact that old fillings made of amalgams are drilled out and removed in the effluent waste when new fillings are effected to replace the old. Further, as noted above, even under current dental practice, an amalgam is preferred for some tooth filling situations.

[007] Because mercury is a poison that can accumulate in living tissues and can pose a health hazard to species in a food chain exposed to mercury-containing compounds, and since humans are inevitably at the end of the food chain, it follows that effluent containing amalgams can pose a health hazard to the community at large. Also, certain metals such as silver are commercially valuable if recovered in quantity. For those reasons, it is desirable to devise systems, apparatus and processes for removing amalgams from dental office effluent and efficiently recycling those amalgams.

[008] In addition to removing amalgams, other matter disposed into dental office suction effluent includes aluminum oxides used in air abrasion treatments and other solid waste material. These solid materials tend to wear out or damage vacuum pumps and other equipment downstream of the dental chair suction apparatus, and also constitute effluent water contaminants. Therefore, it is desirable for the apparatus to remove solid abrasive material and other particulate waste from the dental office suction effluent.

[009] The World Health Organization also points out that amalgam separators, installed in the waste water lines of many dental offices, dramatically decrease the release of mercury into the public sewer system. However, critics say that the separators are still not mandatory in some states of the United States. "Purchasing, installing and operating dental amalgam separators: Practical issues". The Journal of the American Dental Association. 134 (8): 1054–65. doi:10.14219/jada.archive.2003.0319. PMID 12956345. Recently, the EPA has enacted nation-wide regulations requiring amalgam separators in dental offices.

[0010] Previously known apparatus for removing amalgam particles from dental office suction effluent are known to include a collecting tank for collecting a day's accumulation of suction effluent from one or more sources of such waste. The waste is sucked from the dental chair suction apparatus and into the collecting tank by a vacuum pump. When the vacuum

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pump is turned off, an outlet valve is opened and the accumulated waste is deposited into a separation device intended to separate metal particles from the effluent liquid. Flow into the separation device is induced by the head of fluid in the collecting tank. Particles passing through the separation device are separated from the waste by gravity and settle to the bottom of the separation device. The flow rate is dependent on the head inside the collecting tank; as the head diminishes, the flow rate also diminishes. The changes in flow rate are undesirable because the particle separation rate is affected, and the system becomes prone to plugging when the flow rate decreases. Also, since the waste can be deposited only when the vacuum pump is off, waste is usually moved to the separation device at the end of the day. As a result, the collecting tank and separation device tend to be undesirably large and the whole process is time consuming.

[0011] Another known apparatus is a centrifuge type system that separates heavier metal particles from effluent liquid by collecting the particles at the peripheral wall of the centrifuge. This apparatus does not effectively separate lighter particles, and is expensive to purchase and operate due to the complexity of its mechanical parts.

[0012] Yet another known apparatus uses a dedicated mechanical pump to suction waste liquids through a separator device. Again, a dedicated pump can be expensive to purchase and to maintain, and can be undesirably space-consuming.

[0013] Such known systems can become quite complex, unwieldy and expensive, as for example that disclosed in U.S. Pat. No. 5,885,076 granted 23 Mar. 1999. It teaches the use of sedimentation, co-precipitation and filtration in an expensive complicated apparatus that is probably economical, if at all, only for relatively large installations such as a military base dental complex.

[0014] U.S. Pat. No. 6,692,636 and U.S. Pat. No. 6,596,754 are patents that disclose systems for removing amalgam from dental office suction effluent.

[0015] After collecting the amalgam and other solid waste the dentist is left with the problem of what to do with the waste. Either the dentist has to deal with his own hazardous waste or he can send his collected material to a recycler. In either case, the "collection container" needs to be disposable and easily replaceable.

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[0016] Existing recycling programs generally require the provision of bulky shipping materials and the delivery of those materials to the dentist for every full container. If such materials are not provided and the materials are not properly recycled a large part of the benefit of collecting the amalgam waste can be lost. It is important that the waste is recycled under federal guidelines in order to make sure the full benefits of amalgam separation are achieved.

[0017] Additionally, containers for collection, such as dental amalgam recycling systems, can be compromised by incorrect installation or misalignment, which can cause O-rings to deform and/or seal irregularly, and result in leakage.

SUMMARY OF THE INVENTION

[0018] The present invention overcomes many of the shortcomings of the prior technology and achieves further advantages that will be apparent after reviewing the following detailed description.

[0019] In one aspect, the invention comprises a dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device. In certain embodiments, the dental amalgam recycling system of the invention comprises:

[0020] (a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device, an air-water separator tank liquid effluent outlet and an air-water separator tank air outlet;

[0021] (b) a detachable recycling container, said recycling container acting primarily under the influence of gravity to cause settlement of said particles; said recycling container having a recycling container effluent inlet port connected to said air-water separator tank liquid effluent outlet and said recycling container further having an effluent outlet port;

[0022] (c) wherein the air-water separator tank also includes an internal suction conduit;

[0023] (d) wherein the recycling container comprises threads;

[0024] (e) wherein the recycling container effluent inlet port and the recycling container outlet port are not the same height.

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[0025] In certain embodiments, the dental amalgam recycling system further comprises (f) a threaded shipping cap, wherein the threads of the shipping cap and the threads of the recycling container are complementary such that, when the shipping cap is fitted in place, the shipping cap forms a tight seal with said recycling container.

[0026] While in use, the dental amalgam recycling system is functionally associated with a vacuum pump having a vacuum pump inlet. The vacuum pump is typically a pre-existing part of the dental office facility. In particular embodiments, the dental amalgam recycling system is physically connected with a vacuum pump via a suction conduit in the air-water separator. In certain preferred embodiments, the suction conduit is an internal suction conduit within the air-water separator.

[0027] In certain embodiments, the dental amalgam recycling system of the invention further comprise a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port. Said first and second plugs may be held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

[0028] In certain embodiments, the dental amalgam recycling system of the invention further comprise an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

[0029] In certain embodiments, the invention comprises a container, useful as a dental amalgam recycling container, comprising threads for attachment of a shipping cap. In certain embodiments, the dental amalgam recycling container further comprises two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks. The dental amalgam recycling containers of the present invention may further comprise a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal.

[0030] In certain embodiments, the invention comprises an adapter for an air-water separator tank, wherein the adapter enables a recycling container without compatible effluent ports to attach to an air-water separator tank. Said air-water separator tank may comprise, for example, a component of a dental amalgam recycling system, as described above. In certain embodiments, the adapter may comprise threads. In alternative embodiments, the adaptor may be without threads.

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[0031] As described above, the potential for leakage exists in a collection canister such as a recycling container used in the dental amalgam recycling systems described herein. Such leakage may occur, for example, due to incorrect installation, or due to misalignment of a container and its intended mating partner, such as the air-water separation tank or its intended cap, such as a threaded shipping cap, which may cause O-rings to deform and/or seal irregularly. In order to address this problem and/or reduce the potential for leakage, a collection canister, such as a recycling container used in a dental amalgam recycling system, may have one or more irregular 'keyways' cast into its outside top mating surface, and the intended mating partner, such as the air-water separation tank, or the shipping cap, may have one or more corresponding 'key(s)' be cast into its mating surface, such that the key(s) and keyway(s) must be aligned in order for the collection canister (e.g., the recycling container) and its mating partner (e.g., the air-water separation tank; or the shipping cap) to mate properly. This key/keyway system can help ensure even pressure across the entire circumference of the O-ring surface on each port. Similarly, such key(s) and keyway(s) may be used to ensure proper replacement of the container and/or the air-water separation tank, such that incorrect replacement can be avoided or minimized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] FIG. 1 is a schematic front view of an embodiment of particle removal and recycling apparatus according to the invention, for particular use in a dental office.

[0033] FIG. 2 is a schematic side view of an embodiment of particle removal and recycling apparatus according to the invention, for particular use in a dental office.

[0034] FIG. 3 a is a schematic view of an embodiment of a universal adapter for fitting various different sized recycling containers to the air-water separator of the present invention.

[0035] FIG. 3 b is a schematic view of an alternative embodiment of a universal adapter for fitting various different sized recycling containers to the air-water separator of the present invention.

[0036] FIG. 4 a is a schematic view of an embodiment of a recycling container and cap system of the invention.

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[0037] Fig. 4 b is a schematic perspective depiction of an embodiment of a recycling container and cap system of the invention.

[0038] FIG. 5 a is a schematic inside view of an embodiment of a recycling cap for the recycling containers of the invention.

[0039] Fig. 5 b is a schematic depiction of a recycling cap according to the invention fitting on a partial view of a recycling container according to the invention.

[0040] 1-Backplate

[0041] 2-Waste Inlet (from dental practice)

[0042] 3-Air/water Separator Top

[0043] 4-Top Support Bracket

[0044] 5-Air/Water Separation Tank

[0045] 6-Suction tube

[0046] 7-Air/Water Separator Base

[0047] 8-0utlet Tube (to vacuum system)

[0048] 9-Recycling Container Top

[0049] 10-Lower Support Bracket

[0050] 11-Restrictor

[0051] 12-Detachable Recycling Container

[0052] 13-Retaining Pins (2)

[0053] 14- air-water separator tank effluent outlet port

[0054] 15- recycling container inlet port

[0055] 16- recycling container outlet port

[0056] 17- recycling container threads

[0057] 18- two tier recycling cap

[0058] 19- O-ring groove

[0059] 20- cap plugs

[0060] 21- O-ring

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

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[0061] According to one aspect of the instant invention, an apparatus is provided for removing and recycling metal-containing particles and other waste particles from effluent, particularly effluent from a dental office. While herein the term "metal particles" may frequently be employed, it is contemplated that the apparatus is capable of separating other solid particles from effluent liquid.

[0062] According to one aspect of the invention, an apparatus for removing metal particles and other solid particles from liquid suction effluent can be installed in a dental office using a pre-existing suction/vacuum pump system. The apparatus may share a common vacuum pump with conventional dental chair suction apparatus, without interrupting the use of suction equipment at the dental chairs.

[0063] Removal of solid particles from liquid suction effluent is effected by sedimentation.

[0064] In accordance with a one embodiment of the invention, the dental office suction effluent is passed from dental chair suction equipment outlets to an air water separator tank via a suitable inlet port for the tank. The air-water separator tank in turn passes effluent into a sedimentary deposit tank, closed on all sides when in use and preferably readily detachable for emptying or replacement.

[0065] In certain aspects of the instant invention the sedimentary deposit tank has a secondary function as a recycling container. In another aspect of the invention this recycling container can have features built in to make recycling easier and to reduce the amount of packaging and waste in the recycling system.

[0066] In another embodiment of the invention designed to minimize the space required to install the amalgam recycling system the air-water suction tube is internalized – within the air-water separator tank.

[0067] **Figure 1** and **Figure 2** shows two views of the separation apparatus according to the present invention in detail. Effluent from the dental chairs and a quantity of air are sucked through a suction apparatus exhaust conduit, through an air-water separator tank inlet **2**, and thence into an air-water separator tank **5**. The liquid effluent passes out of the air-water separator tank **5** via air-water separator tank outlet port **14**, while air passes

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downstream via the air suction tube **6** while maintaining constant vacuum upstream of amalgam separator.

[0068] The air-water separator tank effluent outlet port **14** passes effluent by gravity out of the air-water separator tank **5** and into the detachable recycling container **12** through the recycling container inlet port **15** for target particle separation by sedimentation. Solids settle and accumulate in the bottom of Recycle container **12**. Liquid content of waste flows primarily by gravity, although intermittently assisted by vacuum through Restrictor **11** which slows the flow rate of liquid to assist in sedimentation process and ultimately "clean" effluent discharge through the recycling container outlet port **16**.

[0069] Outlet ports **16** and inlet port **15** can be a variety of shapes and sizes, square, oval (as depicted), round or even more unusual shapes like a star. Preferred ports are those that provide a tight seal, allow for easy removal, and do not break. Oval or round are preferred embodiments. Round are most preferred.

[0070] A vacuum at the outlet tube **8** is generated when the vacuum pump is operating, thereby sucking air out of the air-water separator tank **5** via suction tube **6** while maintaining vacuum upstream of amalgam separator apparatus. Effluent from the recycling container **12** passes through the restrictor **11** where remaining non-settable fine particles are removed from the effluent and into the recycling container outlet port **16** to be discharged from the apparatus via common outlet tube **8.** Matter sucked by the vacuum pump, generally free of removed solids, is discharged via vacuum pump into a municipal drain of the public sewage system.

[0071] The system is provided with a simple back plate **1** for easy dental office placement as well as removable retaining pins **13** to ensure the recycling container does not detach from the air-water separation tank **5** when there is no vacuum in the system.

[0072] In certain embodiments, the recycling container ports **16** and **15** may be different heights in order to aid in alignment of the detachable recycling container **12** in the air-water separator base **7**. In a preferred embodiment, the outlet port **16** engages before the inlet port **15** while during removal the inlet port **15** disengages first. This causes a small volume of fluid to be pulled out of the collection container back into air-water separator tank **5** creating head space and eliminating upward force of vacuum which eases removal of recycle

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container **12** by operator. Existing devices require rocking, wiggling or applying extensive down force for removal of recycle container **12**.

[0073] In one preferred embodiment of the invention designed to minimize recycling costs and waste, the recycling container/sedimentary deposit tank has threads **17** built into the container to enable the addition of a liquid tight top for shipping.

[0074] **Figure 3** shows a schematic diagram of an adapter according to the invention to enable the use of recycling containers from a variety of sources that are lacking in correctly shaped ports **16** and **15** or otherwise are unable to fit the air-water separator tank **5** according to the invention due to shape differences.

[0075] **Figure 4 a** shows a schematic diagram of the recycling container and cap system (see **Figure 5** for more cap **18** detail) according to the present invention. The cap **18** is a two tier shape to allow for a tight grip by both a big and smaller hand in order to achieve a strong seal as required by the invention. An O-ring **21** is provided and fits into an O-ring groove on the recycling container **12**. Plugs **20** are used to provide a first leak proof seal for the recycling container **12**. These plugs **20** are held in place by the cap **18** when the cap is threaded onto the recycling container as depicted in **Figure 5b**.

[0076] Generally, under present practice, the dental staff will not be able to remove deposited sediment from the recycle container nor remove accumulated particle residues from the restrictor unit themselves. Thus, it is desirable that such removal be done by a competent effluent residue processing facility. Therefore, under present practice, it is expected to be preferred that the recycling container with its enclosed restrictor unit be removed when full, or periodically replaced by fresh tanks from time to time as required. The spent tank with an accumulation of metallic and other particles can then be sent to a processing facility for proper disposal of the targeted metallic particles, such as mercury, and recovery of precious metals such as silver.

[0077] Although the sedimentary deposit process is effective to remove a satisfactorily high proportion of the target particles desired to be removed from the effluent, the recycling container desirably includes an outlet restrictor right in the chamber to catch any floating materials as well as any other materials that did not settle out.

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[0078] If the recycle container is not changed as required or filled beyond normal capacity, waste liquid from dental practice may back up into air water separator tank. Should this occur, effluent overflows through the air suction tube and into the outlet port and is discharged into the vacuum pump draw line and thence eventually into the municipal drain. However, it is desirable that the system should operate in such a manner as to avoid having the air-water separator tank become completely full, since effluent exiting through the air outlet port will contain particles that will not be separated by the separator. If, however, such a by-pass condition occurs at no time will the suction generated by the vacuum pump be lost or interrupted at the dental office.

[0079] In a further embodiment of the invention oriented towards large-scale institutional applications, in which many dental chairs or other sources of effluent are connected to the same suction and drain services, several parallel-connected recycling containers and associated apparatus, each such composite apparatus including a air-water separator tank and preferably one, or alternatively two attached recycling containers, may be operated in parallel to provide sufficient treatment capacity for large effluent volumes.

[0080] All publications, web-sites, patents and patent applications cited in the specification are hereby incorporated herein by reference in their entirety for the disclosure for which they are cited.

[0081] Having read the above specification, other alternatives and variants of the above described methods and apparatus suitable for practicing the methods will occur to those skilled in the technology. Such alternatives, modifications and variants fall within the scope of the present invention.

[0082] The invention as described above also includes the following non-limiting claims, which describe particular embodiments of the invention.

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Claims

1. A dental amalgam recycling system for recycling particles from a dental liquid effluent drawn from a suctioning device, comprising:

   (a) an air-water separator tank for receiving said effluent, said air-water separator tank having an air-water separator tank inlet in fluid communication with said suctioning device; an air-water separator tank liquid effluent outlet; and an air-water separator tank air outlet;

   (b) a detachable recycling container, said recycling container acting primarily under the influence of gravity to cause settlement of said particles; said recycling container having a recycling container effluent inlet port connected to said air-water separator tank liquid effluent outlet; and said recycling container further having an effluent outlet port;

   (c) wherein the air-water separator tank also includes an internal suction conduit;

   (d) wherein the recycling container comprises threads;

   (e) wherein the recycling container effluent inlet port and the recycling container outlet port are not the same height.

2. The dental amalgam recycling system of claim 1, further comprising: (f) a threaded shipping cap for said recycling container; and

3. The dental amalgam recycling system according to claim 1, further comprising a first plug for said recycling container inlet port and a second plug for said recycling container effluent outlet port.

4. A dental amalgam recycling system according to claim 3 wherein said first and second plugs are held tightly in place by said threaded shipping cap when said shipping cap is fitted in place.

5. A dental amalgam recycling system according to claim 4 further comprising an O-ring that provides an air and effluent tight seal when said shipping cap is fitted in place.

6. A dental amalgam recycling container comprising threads for attachment of a shipping cap.

7. A dental amalgam recycling container according to claim 6 further comprising two plugs held in place by said shipping cap and an O-ring fitted in an O-ring groove to prevent leaks.

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8. A dental amalgam recycling container according to claim 7 further comprising a two tier cap that enables people with hands of different sizes to grip the cap and tighten to achieve a very tight seal.

9. An adapter for an air-water separator tank wherein the adapter enables a recycling container without compatible effluent ports to attach to the air-water separator tank of the dental amalgam recycling system of claim 1.

10. An adapter according to claim 9, wherein the adapter is without threads.

11. A dental amalgam recycling system according to claim 1, wherein said recycling container further comprises one or more irregular keyways cast into its outside top mating surface; and said air-water separation tank has one or more keys cast into its mating surface, such that the keys of the air-water separation tank and the keyways of said recycling container must be aligned in order for said recycling container and said air-water separation tank to mate securely.

12. A dental amalgam recycling system according to claim 2, wherein said recycling container further comprises one or more irregular keyways cast into its outside top mating surface; and said threaded shipping cap has one or more keys cast into its mating surface, such that the keys of said shipping cap and the keyways of said recycling container must be aligned in order for said recycling container and said shipping cap to mate securely.

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ABSTRACT

The present invention provides dental amalgam recycling systems, useful for recycling particles from a dental liquid effluent drawn, for example, from a suctioning device.

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Figure 1

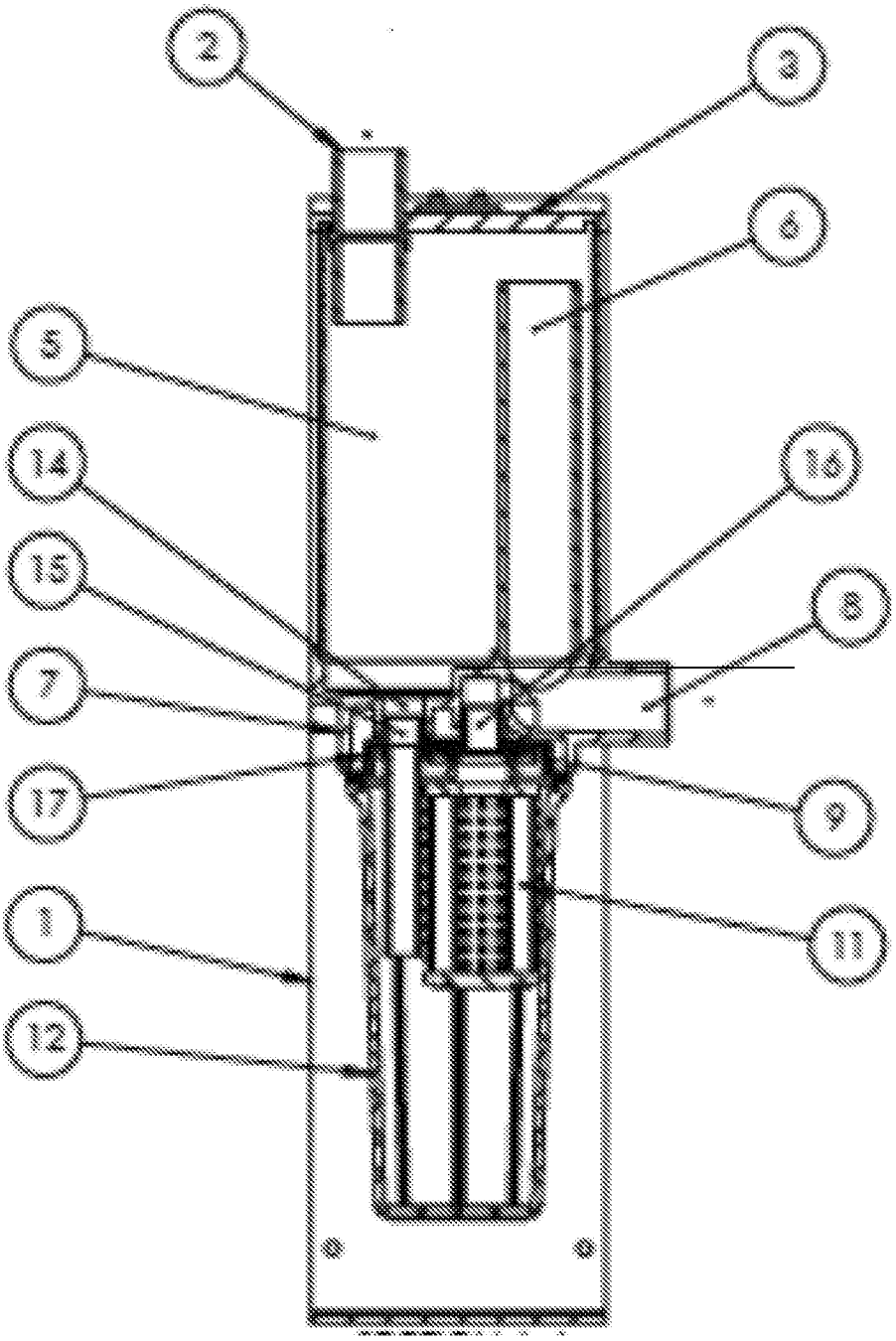

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Figure 2

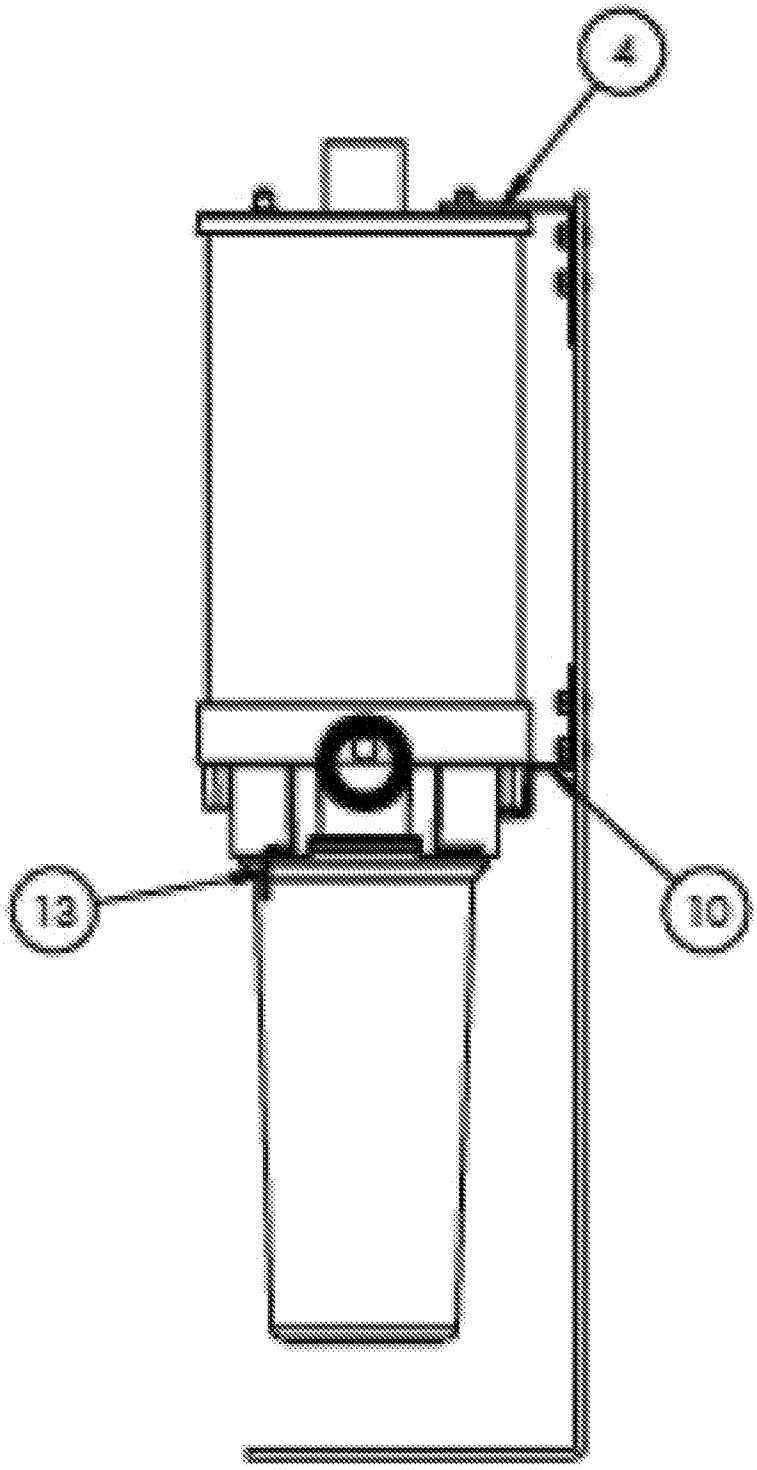

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Figure 3a.

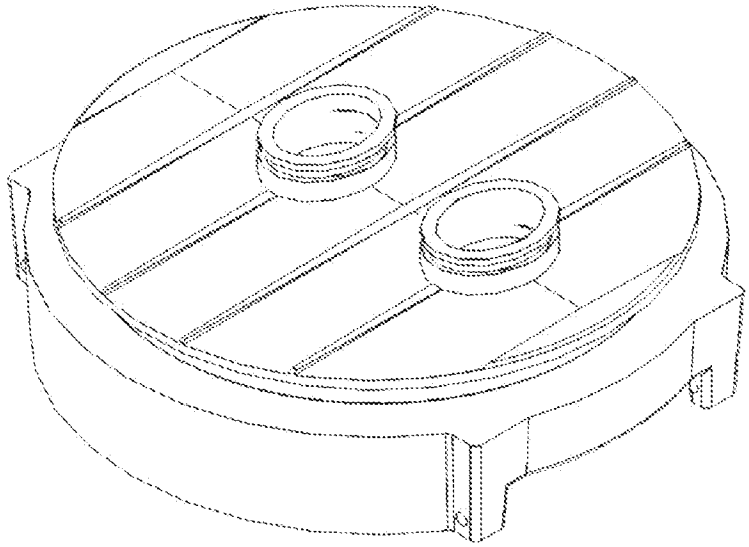

Figure 3b.

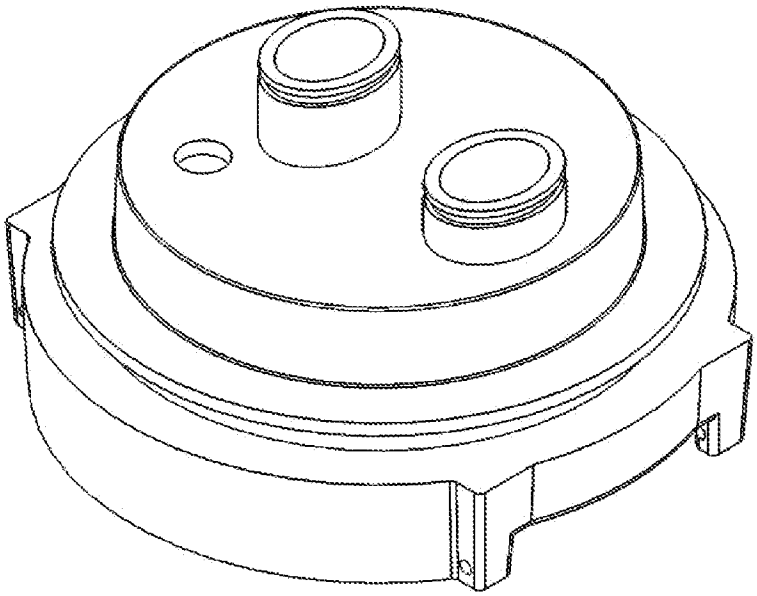

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Figure 4a

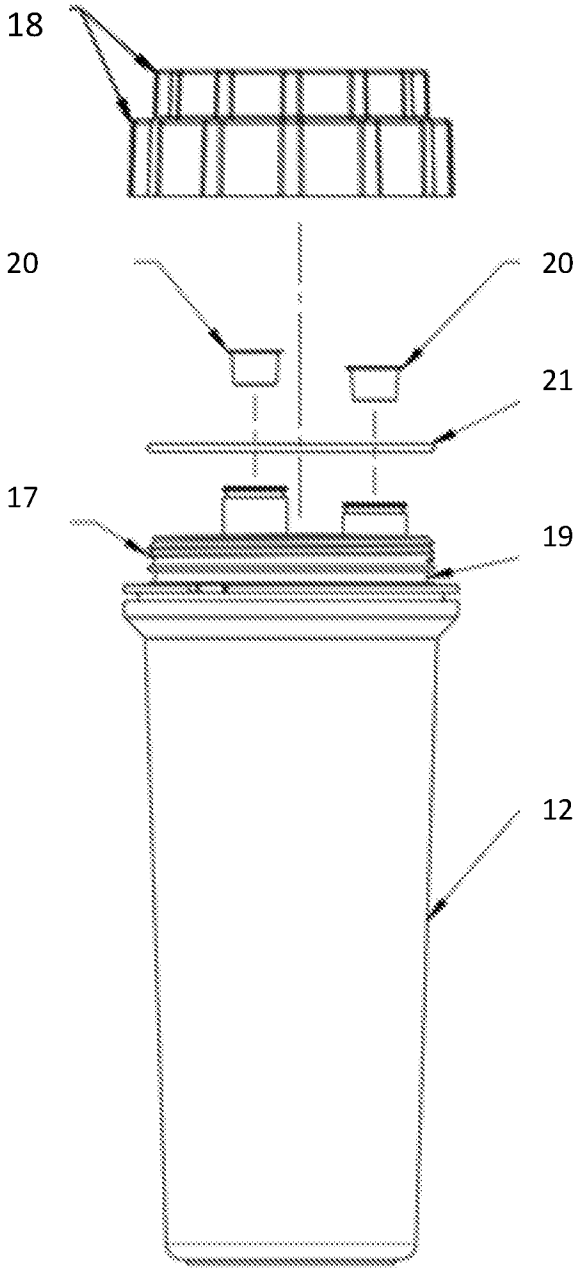

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Figure 4b

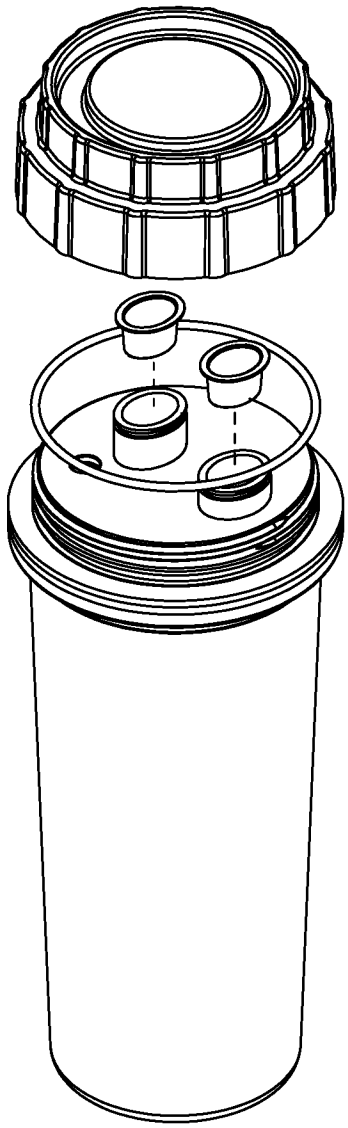

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Figure 5a

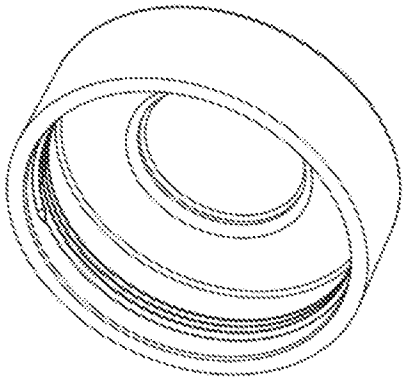
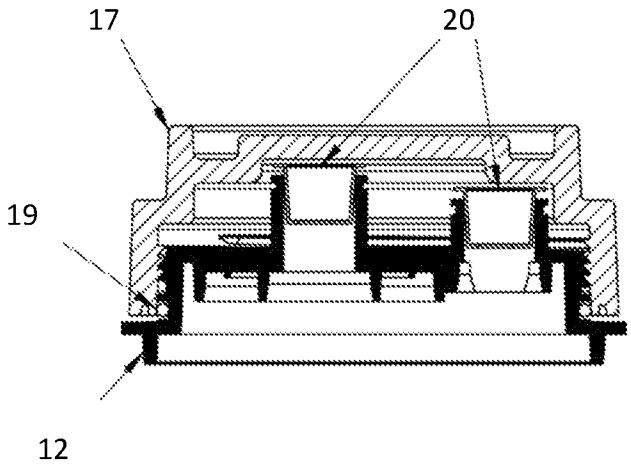


Figure 5b



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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**730**

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Electronic Acknowledgement Receipt

EFS ID:	30633569
Application Number:	15730828
International Application Number:	
Confirmation Number:	9884
Title of Invention:	DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-US
Receipt Date:	12-OCT-2017
Filing Date:	
Time Stamp:	10:26:20
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	SMTX-001-aia0014-ads.pdf	1823414 8a0fa1431296e6fbacc95d4638575693e8407561	no	9

Warnings:

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Information:					
2		SMTX-001_Non-Prov_10-12-2017.pdf	605999 24107fd9f6b54179e1b24673b204c63ad4282b3a	yes	20

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	11
	Claims	12	13
	Abstract	14	14
	Drawings-only black and white line drawings	15	20

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	34586 96ac8d95b5bb0c48c9817b81ad5fbdfb29cd79a0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2463999		

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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.

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