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, VA 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.
17/965,556	30-MAY-23	11660175

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

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	05/30/2023	11660175	SMTX-001-T2	8686

80709 7590 05/10/2023

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

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

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 Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

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

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

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

Solmetex LLC, Northborough, MA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

List of References **FIRST INFORMATION DISCLOSURE STATEMENT** Page 3 of 5	Atty. Docket No. SMTX-001-T2	Application No.: Cont. of 16/941,522
	Applicant(s): Solmetex LLC	
	Filing Date: July 28, 2020	Art Unit: Central, Docket

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A57	6,592,754 B2	07/15/2003	Chilibeck
	A58	6,592,769 B2	07/15/2003	Erickson
	A59	6,638,066 B2	10/28/2003	Hubner
	A60	6,660,160 B1	12/09/2003	Ernryd
	A61	6,692,636 B2	02/17/2004	Chilibeck
	A62	6,790,038 B2	09/14/2004	Hubner
	A63	6,797,178 B2	09/28/2004	Albiston
	A64	D503,097 S	03/22/2005	Burr
	A65	D503,110 S	03/22/2005	Burr
	A66	6,946,069 B2	09/20/2005	Chilibeck
	A67	D522,359 S	06/06/2006	Van Diepen
	A68	7,063,793 B2	06/20/2006	Albiston
	A69	7,080,425 B2	07/25/2006	Smith
	A70	7,131,839 B2	11/07/2006	March
	A71	7,156,214 B2	01/02/2007	Pradel
	A72	7,166,214 B2	01/23/2007	Armstrong
	A73	D536,247 S	02/06/2007	Burr
	A74	7,182,599 B2	02/27/2007	Stone
	A75	7,306,460 B2	12/11/2007	Hubner
	A76	D574,237 S	08/05/2008	Yates, III
	A77	7,422,615 B2	09/09/2008	Kim
	A78	7,604,674 B2	10/20/2009	Han
	A79	7,753,976 B2	07/13/2010	Hyun
	A80	7,767,079 B2	08/03/2010	Darcy
	A81	D630,094 S	01/04/2011	Maxwell
	A82	8,393,898 B2	03/12/2013	McCary
	A83	8,636,837 B2	01/28/2014	Nonnenmacher
	A84	8,692,636 B2	~~02/17/2004~~ 04/2014	~~Chilibeck~~ Reuber

Change(s) applied to document, /C.G./ 4/25/2023

EXAMINER: /NICHOLAS D LUCCHESI/	**DATE CONSIDERED:** 01/13/2023

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of the issue fee in order not to jeopardize expeditious.**

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, 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.
17/665,896	02/13/2022	Nicholas Showalter	SMTX-009-T2	8686

TITLE OF INVENTION: Detachable Recycling Container

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEES DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	07/13/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
LUCCHESI, NICHOLAS D	3772	433-083000

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/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

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

1 ____
2 ____
3 ____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document 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: Solmetex, LLC

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

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)

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

☒ Electronic Payment via Patent Center or 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

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

☐ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature /Steven R. Lazar/ Date 4/17/2023

Typed or printed name Steven R. Lazar Registration No. 32618

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	17965556
Filing Date:	13-Oct-2022
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-T2

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	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**480**

Electronic Acknowledgement Receipt

EFS ID:	47855526
Application Number:	17965556
International Application Number:	
Confirmation Number:	8686
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-T2
Receipt Date:	17-APR-2023
Filing Date:	13-OCT-2022
Time Stamp:	18:01:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$480
RAM confirmation Number	E20234GI02346312
Deposit Account	
Authorized User	

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	SMTX-001-T3_PTOL-85-PartB.pdf	87687 b70d829b17183d519ad903b0f4ba656ab7f685e2	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38061 31e97775de507186c4db476fd8bed500d4b99c21	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	125748		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

80709 7590 04/13/2023

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

EXAMINER	
LUCCHESI, NICHOLAS D	
ART UNIT	PAPER NUMBER
3772	

DATE MAILED: 04/13/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

TITLE OF INVENTION: Detachable Recycling Container

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	07/13/2023

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 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted 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. 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.

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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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

80709 7590 04/13/2023

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.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

TITLE OF INVENTION: Detachable Recycling Container

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	07/13/2023

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/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

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

1 _____
2 _____
3 _____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document 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)

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

❑ Electronic Payment via Patent Center or 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

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

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

80709 7590 04/13/2023

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

EXAMINER	
LUCCHESI, NICHOLAS D	
ART UNIT	PAPER NUMBER
3772	

DATE MAILED: 04/13/2023

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

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

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

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

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

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

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

Notice of Allowability	Application No. 17/965,556	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 3/22/23.
   ☐ 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 13-21 and 23-35 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

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

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

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

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

/NICHOLAS D LUCCHESI/
Primary Examiner, Art Unit 3772

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	Mozzicato et al.
	Examiner	**Art Unit**
	NICHOLAS D LUCCHESI	3772

CPC								
Symbol							**Type**	**Version**
A61C	/	17	/	065			F	2019-05-01
B65D	/	43	/	0231			I	2013-01-01
B01D	/	21	/	2444			I	2013-01-01
A61M	/	1	/	64			I	2021-05-01
B65D	/	2543	/	00092			A	2013-01-01

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	22	
/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	07 April 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20230407

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	Mozzicato et al.
	Examiner	**Art Unit**
	NICHOLAS D LUCCHESI	3772

INTERNATIONAL CLASSIFICATION					
CLAIMED					
A61C	/	17	/	06	
NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	07 April 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20230407

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	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	7	19	15	28								
	2		11	8	20	16	29								
	3		12	9	21	17	30								
	4	1	13		22	18	31								
	5	2	14	10	23	19	32								
	6	3	15	11	24	20	33								
	7	4	16	12	25	21	34								
	8	5	17	13	26	22	35								
	9	6	18	14	27										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	07 April 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20230407

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	Mozzicato et al.
	Examiner	Art Unit
	NICHOLAS D LUCCHESI	3772

CPC - Searched*		
Symbol	Date	Examiner
A61C 17/065; A61M 1/64; B01D 21/2444; B65D 43/0231, 2543/00092	01/13/2023	NL
search updated	03/08/2023	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
Assignee Search; Inventor Search	01/13/2023	NL
search updated	03/08/2023	NL

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
A61C	17/065	04/07/2023	NL
A61M	1/64	04/07/2023	NL
B01D	21/2444	04/07/2023	NL
B65D	43/0231; 2543/00092	04/07/2023	NL

/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	Mozzicato et al.
	Examiner	**Art Unit**
	NICHOLAS D LUCCHESI	3772

/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	

PGR2023-00055 Ex. 1002

Page 19 of 346

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	11	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/01/13 11:10 PM
L2	20	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/01/13 11:22 PM
L3	209	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:23 PM
L4	153	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L5	1014	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L6	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L7	669	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L8	4544	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:25 PM
L9	6164	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:25 PM
L10	73	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:26 PM
L11	226	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:31 PM
L12	39	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:32 PM
L13	45	L11 AND flange	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:32 PM
L14	14	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/03/08 02:57 PM
L15	21	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/03/08 02:57 PM
L16	212	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L17	158	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM

L18	1024	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L19	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L20	682	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L21	4580	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L22	6222	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L23	75	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L24	229	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L25	40	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L26	46	L11 AND flange	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L27	14	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/04/07 06:22 PM
L28	21	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/04/07 06:22 PM
L29	214	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L30	158	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L31	1026	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L32	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L33	689	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L34	4597	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L35	6246	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L36	76	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L37	230	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L38	40	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L39	46	L11 AND flange	(US-PGPUB; USPAT;	OR	ON	ON	2023/04/07

			EPO; JPO)				06:22 PM
L40	14	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/04/07 06:22 PM
L41	21	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/04/07 06:22 PM
L42	214	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L43	158	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L44	1026	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L45	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L46	689	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L47	4597	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L48	6246	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L49	76	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L50	230	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L51	40	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM
L52	46	L11 AND flange	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/04/07 06:22 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	6093	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT)	OR	ON	ON	2023/04/07 06:30 PM

amendment approved for entry.

/N.L./

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	17/965,556
Confirmation No.	:	*8686*
Inventor	:	*Nicholas Mozzicato*
Applicant	:	*Solmetex LLC*
Filed	:	*October 13, 2022*
Title	:	*Detachable Recycling Container*
TC/A.U.	:	*3773*
Examiner	:	*Nicholas D. Lucchesi*
Docket No.	:	*SMTX-001-T2*

Commissioner for Patents – via EFS
P.O. Box 1450
Alexandria, Virginia 22313-1450

RESPONSE TO FINAL OFFICE ACTION DATED MARCH 16, 2023

Dear Commissioner:

In response to the Final Office Action mailed on March 16, 2023, Applicant submits the following Response. The Applicant respectfully requests that this Response to the Final Office Action be entered into the record of the above-captioned patent application.

The Applicant's **Amendments to the Specification** are presented on page 2 of this paper.

The Applicant's **Amendments to the Drawings** are presented on page 4 of this paper.

The Applicant's **Listing of Claims** is presented on page 5 of this paper.

The Applicant's **Remarks** begin on page 12 of this paper.

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

BIB DATA SHEET

CONFIRMATION NO. 8686

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
17/965,556	10/13/2022 RULE	433	3772	SMTX-001-T2

APPLICANTS
Solmetex LLC, Northborough, MA;

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

**** CONTINUING DATA ***************************
This application is a CON of 16/941,522 07/28/2020
which is a CIP of 16/033,823 07/12/2018 PAT 10779923
which is a CIP of 15/730,828 10/12/2017 PAT 10646313
which claims benefit of 62/414,712 10/29/2016
and claims benefit of 62/406,990 10/12/2016
and is a CON of 29/585,674 11/28/2016 PAT D840534
and is a CON of 29/585,668 11/28/2016 PAT D835779
and is a CON of 29/585,659 11/28/2016 PAT D835778
and is a CON of 29/577,701 09/14/2016 PAT D848612
and is a CON of 29/567,544 06/09/2016 PAT D840533
and is a CON of 29/565,622 05/23/2016 PAT D835264

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
10/26/2022

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
❑ Yes ☑ No	❑ Yes ☑ No	/Nicholas D. Lucchesi/ Examiner's Signature	❑ Initials	MA	26	19	3

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

TITLE
Detachable Recycling Container

FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT

❑ All Fees
❑ 1.16 Fees (Filing)
❑ 1.17 Fees (Processing Ext. of time)

BIB (Rev. 05/07).

FILING FEE RECEIVED 0.00	No._____ for following:	❑ 1.18 Fees (Issue) ❑ Other _____ ❑ Credit

LISTING OF CLAIMS:

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

1-12. (Cancelled)

13. (Previously Presented) A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure for engaging the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, the at least one radially protruding

structure being located radially outward relative to the periphery of the circular upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.

14. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the container inlet port and the container outlet port extend above the circular upper surface by the same height.

15. (Previously Presented) The detachable dental-amalgam container of claim 13, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container.

16. (Previously Presented) The detachable dental-amalgam container of claim 15, further including a cap configured to retain at least one of the plugs on the filled detachable dental-amalgam container.

17. (Previously Presented) The detachable dental-amalgam container of claim 16, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.

18. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the container top portion has a maximum outer dimension that is greater than a maximum outer diameter of the main body.

19. (Currently Amended) The detachable dental-amalgam container of claim 13, wherein the container outlet port is configured for fluidic coupling to the system outlet of the dental amalgam separation system that transfers fluid from the dental amalgam effluent to a municipal water disposal system.

20. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the at least one radially protruding structure includes a flange extending in a direction away from the generally cylindrical upper region.

21. (Previously Presented) The detachable dental-amalgam container of claim 20, wherein the flange extends entirely around the container top portion.

22. (Cancelled)

23. (Currently Amended) The detachable dental-amalgam container of claim 13, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the circular upper surface, the detachable dental-amalgam container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

24. (Previously Presented) The detachable dental-amalgam container of claim 23, wherein the keying feature includes a recess formed in an outermost periphery of the container top portion.

25. (Currently Amended) A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source for moving fluid from the dental amalgam effluent through the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the upper surface than the container outlet port, the container inlet port and the container outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable dental-amalgam container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move fluid from the dental amalgam effluent toward the system outlet, the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure defining a pin-receiving region therebelow for receiving the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward from the periphery of the upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through ~~into~~ the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.

26. (Previously Presented) The detachable dental-amalgam container of claim 25, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap that retains at least one of the plugs on the filled detachable dental-amalgam container.

27. (Currently Amended) The detachable dental-amalgam container of claim 26, wherein the cap has internal threads that threadably mate with corresponding threads on the generally cylindrical upper region of the container top portion to retain the pair of plugs on the detachable dental-amalgam container. ~~an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port~~.

28. (Previously Presented) The detachable dental-amalgam container of claim 25, wherein the at least one radially protruding structure includes a flange extending away from the generally cylindrical upper region.

29. (Previously Presented) The detachable dental-amalgam container of claim 28, wherein the flange extends entirely around the container top portion.

30. (Previously Presented) The detachable dental-amalgam container of claim 28, wherein the flange includes a curved outer surface.

31. (Currently Amended) A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, a system outlet, a vacuum source for moving-fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the dental amalgam separation system;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including at least one radially protruding structure located below the upper generally cylindrical region, the at least one radially protruding structure having a lower surface under which the at least one retaining pin of the dental amalgam separation system is received to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward relative to the periphery of the circular upper surface; and

wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and

wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is moved from the interior volume

of main body, through the container outlet port, and into the system outlet due to the vacuum source acting on the dental amalgam separation system.

32. (Currently Amended) The detachable dental-amalgam container of claim 31, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region, the detachable dental-amalgam container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

33. (Previously Presented) The detachable dental-amalgam container of claim 31, wherein the at least one radially protruding structure includes a flange extending away from the generally cylindrical upper region, the flange includes a curved outer surface.

34. (Previously Presented) The detachable dental-amalgam container of claim 33, wherein the flange extends entirely around the container top portion.

35. (Previously Presented) The detachable dental-amalgam container of claim 33, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap configured to retain at least one of the plugs on the filled detachable dental-amalgam container.

REMARKS

Claims 13-21 and 23-35 remain in the application for further prosecution. Claim 22 is presently being cancelled. Claim 19, 23, 25, 27, 31, and 32 are presently being amended. No new matter is being added.

Drawing Objection

The drawing objection is related to claim 22. The basis for the rejection is that the drawings allegedly fail to show the o-rings on the inlet and outlet ports of claim 22. The specification discloses that there is an "O-ring surface on each port" (Para [0035]) and the o-rings can be seen at the top of the inlet and outlet ports 15, 16 in FIGS. 4B and FIGS. 6-11. However, in the interest of advancing prosecution towards an allowance, the Applicant has cancelled dependent claim 22 to obviate the drawing objection.

Specification Objection

The specification objection relates to the use of the antecedent basis for some of the claim elements and, specifically, the language of dependent claim 27, the main body, the central axis, the interior volume, the container top portion, the cylindrical upper region, the circular upper surface, the radially protruding structure, the pin-engaging surface, and the container inlet conduit. Each of these claim elements is addressed.

- Dependent claim 27: This claim previously called for two circular internal walls of the cap to engage the pair of plugs. As an example of this configuration, the Applicant notes that the two plugs 20 are held by the two internal walls of the cap 18 shown in FIGS. 5A and 5B. However, to follow the existing language in the specification related to the cap and its functionality, the Applicant has amended dependent claim 27 to describe the internal threads of the cap that threadably mate with the threads 17 on the generally cylindrical upper region to assist in retaining the pair of plugs as described, for example, in Paragraphs [0026], [0028], and [0088]. As such, this claim amendment is supported by the original specification and the drawings.

- The "main body" and the "interior volume": The detachable dental-amalgam container 12 has a main body with an interior volume for receiving the dental amalgam effluent, as shown throughout the drawings, such as FIG. 1. Paragraph [0081] has been amended to specifically use the term "main body" and "interior volume", which is supported by the original specification and drawings.
- The "central axis": The "central axis" for the detachable dental-amalgam container 12 is shown in FIG. 4A, which also defines the central axis of the main body of the detachable container 12. Paragraph [0088] has been amended accordingly in a manner that is supported by the original specification and drawings.
- The "container top portion": The container top portion is mentioned in Paragraph [0049] as being associated with reference numeral 9, which is shown in FIG. 1. For clarity, FIGS. 4B and 5B have now been amended to include reference numeral 9 to refer to the container top portion. Paragraphs [0081] and [0086] have been amended to specifically use the term "container top portion", which is supported by the original specification and drawings.
- The "cylindrical upper region" and the "circular upper surface": The cylindrical upper region of the container top portion 9 that has the circular upper surface is shown throughout the figures. For example, as shown in FIGS. 1 and 4A, the generally cylindrical upper region is where the threads 17 of the container are located. Paragraph [0086] has been amended to specifically use the term "generally cylindrical upper region." Paragraph [0089] describes the inlet port 15 and the outlet port 16 in FIGS. 6-11 and has been amended to refer to the circular upper surface of the container top portion. These amendments are supported by the original specification and drawings.
- The "radially protruding structures": Paragraph [0084] has been amended to specifically use the term "radially protruding structures" that can be engaged by the removable retaining pins 13. The flange 22 illustrated in FIGS. 4A and 4B is one example of such a radially protruding structure. This amendment is supported by the original specification and drawings.

- The "pin-engaging surface": This claim element was removed from claim 13 in the prior amendment and, thus, that term has not been added to the current specification.
- The "container inlet conduit": As shown in FIG. 1, a container inlet conduit extends downwardly directly below the container inlet port 15 and into the interior volume of the main body of the detachable recycling container 12. Paragraph [0081] has been amended to describe this configuration in a manner that is supported by the original specification and drawings.

The Applicant appreciates the Examiner's careful review of the claims and specification, and believes that the changes to the specification submitted in response should obviate the specification objections. The Applicant further notes that 37 CFR §1.75(d)(1) and MPEP §608.01(o) indicate the terms and phrases used in the claims should find support or antecedent basis in the description. As noted above, the Applicant believes the skilled artisan would understand the claim elements subject to these objections are clearly supported by the originally filed specification and drawings. As such, no new matter has been added. *See also. Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc) ("the description requirement does not demand any particular form of disclosure, or that the specification recite the claimed invention *in haec verba*").

Section 112 Rejections

Claims 19, 22-35 have been rejected under 35 U.S.C. §112 as requiring certain clarifying modifiers (*e.g.*, "dental-amalgam") that should be added these claims.

Again, the Applicant appreciates the Examiner's careful review of the claims. The Applicant has made the Examiner's suggested clarifying amendments and, thus, the Applicant believes that all pending claims meet the requirements of 35 U.S.C. §112. Additionally, the Applicant found an additional instance for using the "dental-amalgam" modifier in claim 25, line 6 and has made that change as well.

Conclusion

Applicant submits that the claims are in a condition for allowance and action toward that end is earnestly solicited. If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact Applicant's undersigned attorney at the number indicated.

It is believed that no fees are due; however, should any fees be required (except for payment of the issue fee), the Commissioner is requested to contact the undersigned attorney for Applicant.

Respectfully submitted,

Date: March 22, 2023

By: /Steven R. Lazar/
Steven R. Lazar
Attorneys for Applicant
Registration No. 32,618

DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

RELATED APPLICATIONS

[1] 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

[2] 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

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] 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.

[16] 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.

[17] 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.

[18] 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

[19] 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.

[20] 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:

[21] (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;

[22] (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;

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

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

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

[26] 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

[32] 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

[33] 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.

[34] 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.

[35] FIG. 3a 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.

[36] FIG. 3b 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.

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

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

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

[40] Fig. 5b 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.

[41] 1-Backplate

[42] 2-Waste Inlet (from dental practice)

[43] 3-Air/water Separator Top

[44] 4-Top Support Bracket

[45] 5-Air/Water Separation Tank

[46] 6-Suction tube

[47] 7-Air/Water Separator Base

[48] 8-0utlet Tube (to vacuum system)

[49] 9-Recycling Container Top Portion

[50] 10-Lower Support Bracket

[51] 11-Restrictor

[52] 12-Detachable Recycling Container

[53] 13-Retaining Pins (2)

[54] 14- air-water separator tank effluent outlet port

[55] 15- recycling container inlet port

[56] 16- recycling container outlet port

[57] 17- recycling container threads

[58] 18- two tier recycling cap

[59] 19- O-ring groove

[60] 20- cap plugs

[61] 21- O-ring

[62] 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.

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

[64] 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.

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

[66] 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.

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

[68] 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.

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

[70] 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.

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

[72] 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.

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

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

[74] 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.

[75] 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.

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

[77] 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.

[78] 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.

[79] 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.

[80] 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.

[81] 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 on the container top portion 9 for target particle separation by sedimentation. After the effluent passes through the inlet port 15 and through the container inlet conduit in the interior volume of the main body of the detachable recycling container 12, solids settle and accumulate in the bottom of the interior volume of the main body of the detachable recycling 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 on the container top portion 9.

[82] 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.

[83] 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.

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

[85] 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.

[86] 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 generally cylindrical upper region of the container top portion 9 to enable the addition of a liquid tight top for shipping.

[87] **Figure 3** shows a schematic diagram of an adapter **25** 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.

[88] **Figure 4a** 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 **19** on the recycling container **12** above a flange structure **22** that protrudes radially away from the central axis of the main body of the recycling container **12**. The removable retaining pins **13,** described above with respect to Figure 2, fit within the region below the flange structure **22.** 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**.

[89] **Figure 6** through **Figure 11** show several embodiments of irregular keyways **23** on a recycling container. The inlet port **15** and the outlet port **16** are on the circular upper surface of the container top portion, and the irregular keyways **23** are cast into the outer top mating surface.

[90] 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.

[91] 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.

[92] 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.

[93] 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.

[94] 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.

[95] 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.

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

DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

RELATED APPLICATIONS

[1] 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

[2] 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

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] 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.

[16] 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.

[17] 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.

[18] 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

[19] 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.

[20] 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:

[21] (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;

[22] (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;

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

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

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

[26] 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

[32] 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

[33] 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.

[34] 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.

[35] FIG. 3a 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.

[36] FIG. 3b 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.

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

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

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

[40] Fig. 5b 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.

[41] 1-Backplate

[42] 2-Waste Inlet (from dental practice)

[43] 3-Air/water Separator Top

[44] 4-Top Support Bracket

[45] 5-Air/Water Separation Tank

[46] 6-Suction tube

[47] 7-Air/Water Separator Base

[48] 8-0utlet Tube (to vacuum system)

[49] 9-Recycling Container Top Portion

[50] 10-Lower Support Bracket

[51] 11-Restrictor

[52] 12-Detachable Recycling Container

[53] 13-Retaining Pins (2)

[54] 14- air-water separator tank effluent outlet port

[55] 15- recycling container inlet port

[56] 16- recycling container outlet port

[57] 17- recycling container threads

[58] 18- two tier recycling cap

[59] 19- O-ring groove

[60] 20- cap plugs

[61] 21- O-ring

[62] 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.

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

[64] 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.

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

[66] 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.

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

[68] 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.

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

[70] 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.

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

[72] 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.

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

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

[74] 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.

[75] 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.

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

[77] 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.

[78] 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.

[79] 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.

[80] 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.

[81] 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 on the container top portion 9 for target particle separation by sedimentation. After the effluent passes through the inlet port 15 and through the container inlet conduit in the interior volume of the main body of the detachable recycling container 12, solids ~~Solids~~ settle and accumulate in the bottom of the interior volume of the main body of the ~~Recycle~~ detachable recycling 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 on the container top portion 9.

[82] 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.

[83] 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.

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

[85] 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.

[86] 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 generally cylindrical upper region of the container top portion 9 to enable the addition of a liquid tight top for shipping.

[87] **Figure 3** shows a schematic diagram of an adapter **25** 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.

[88] **Figure 4a** 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 **19** on the recycling container **12** above a flange structure **22** that protrudes radially away from the central axis of the main body of the recycling container **12**. The removable retaining pins **13,** described above with respect to Figure 2, fit within the region below the flange structure **22.** 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**.

[89] **Figure 6** through **Figure 11** show several embodiments of irregular keyways **23** on a recycling container. The inlet port **15** and the outlet port **16** are on the circular upper ~~top mating~~ surface of the container top portion, and the irregular keyways **23** are cast into the outer top mating surface.

[90] 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.

[91] 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.

[92] 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.

[93] 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.

[94] 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.

[95] 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.

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

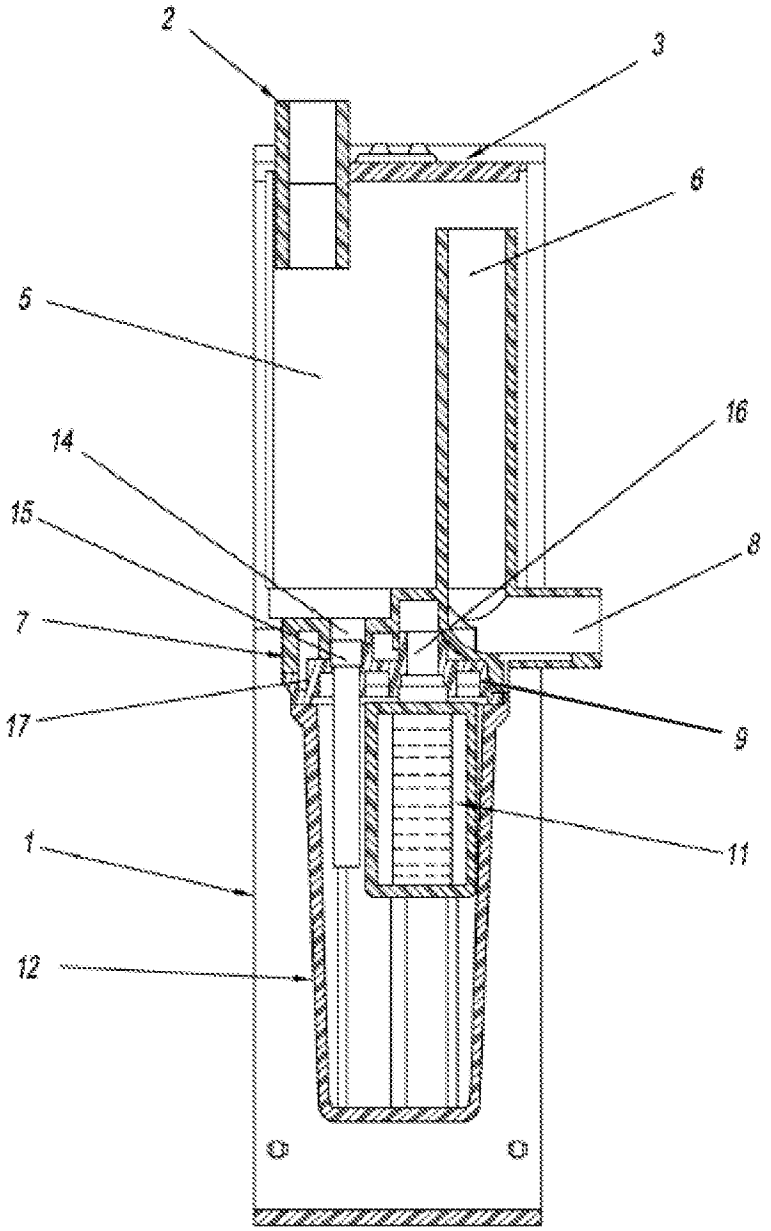


FIG. 1

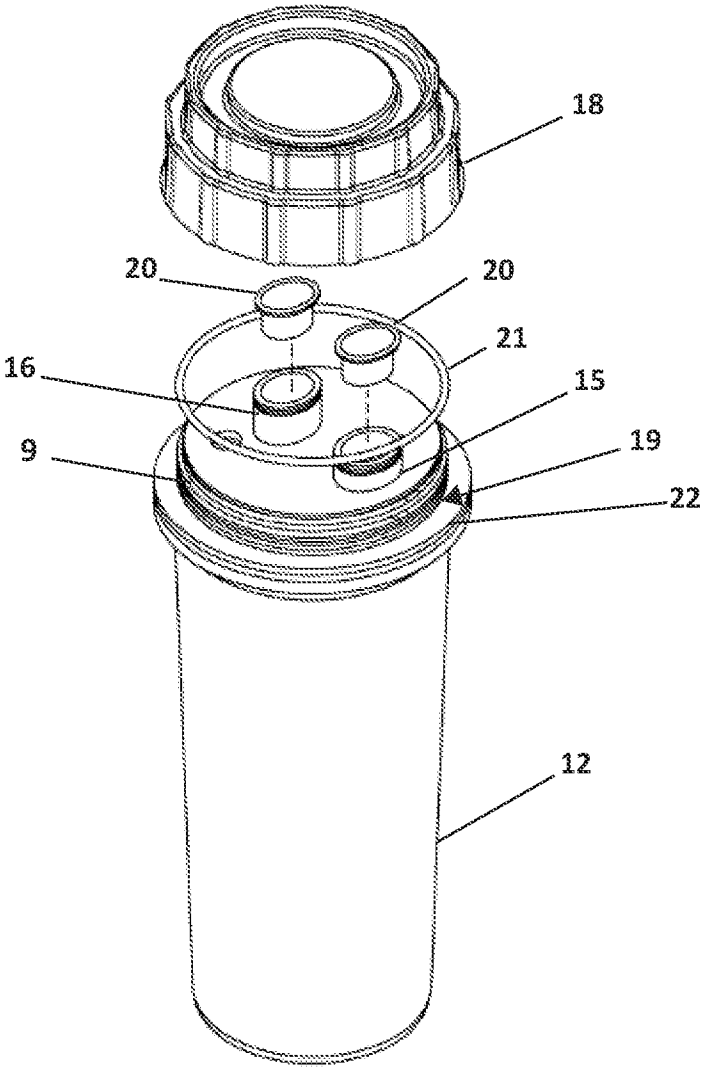


FIG. 4B

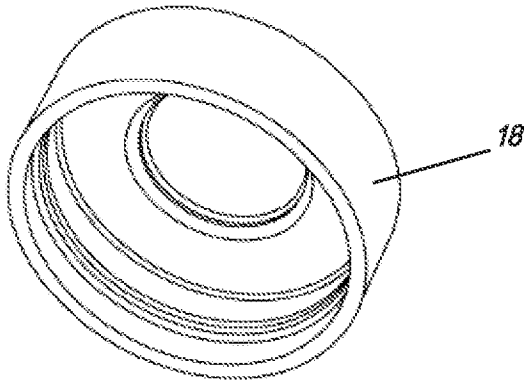


FIG. 5A

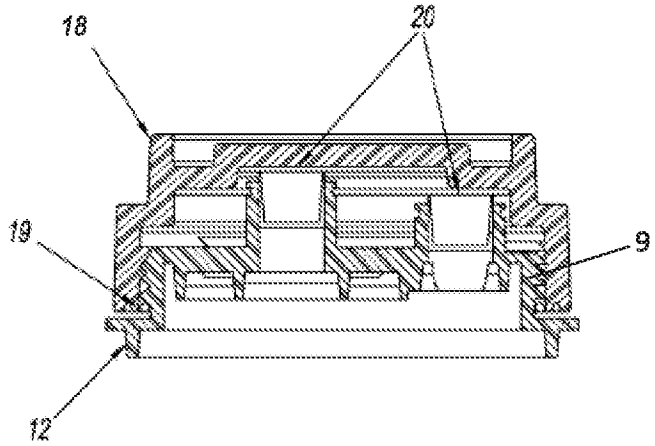


FIG. 5B

Electronic Acknowledgement Receipt

EFS ID:	47728643
Application Number:	17965556
International Application Number:	
Confirmation Number:	8686
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-T2
Receipt Date:	22-MAR-2023
Filing Date:	13-OCT-2022
Time Stamp:	19:52:00
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		SMTX-T2-Response_To_Final_OA_Dated_Mar_16_2023.pdf	156213 cf55d457ce29365a04c7f813626557f5686e29f6	yes	15

	Multipart Description/PDF files in .zip description			
	Document Description	**Start**	**End**	
	Response After Final Action	1	4	
	Claims	5	11	
	Applicant Arguments/Remarks Made in an Amendment	12	15	

Warnings:					
Information:					
2	Specification	SMTX-T2-17965556-SPECIFICATION-CLEAN-Submitted-3-22-23.pdf	112115 181436a643bc3e942be855e93124cdea5d43614a	no	13
Warnings:					
Information:					
3	Specification	SMTX-T2-17965556-SPECIFICATION-MARKED-UP-Submitted-3-22-23.pdf	114426 cca333c7d43e81b777f84662064341c2f45426e5	no	13
Warnings:					
Information:					
4	Drawings-only black and white line drawings	SMTX-T2-17965556-Drawings-Replacement-Sheets-Submitted-3-22-2023.pdf	177948 18a908823d1375eaab631f997e5ee6201190ad66	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	560702		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	17/965,556
Confirmation No.	:	*8686*
Inventor	:	*Nicholas Mozzicato*
Applicant	:	*Solmetex LLC*
Filed	:	*October 13, 2022*
Title	:	*Detachable Recycling Container*
TC/A.U.	:	*3773*
Examiner	:	*Nicholas D. Lucchesi*
Docket No.	:	*SMTX-001-T2*

Commissioner for Patents – via EFS
P.O. Box 1450
Alexandria, Virginia 22313-1450

RESPONSE TO FINAL OFFICE ACTION DATED MARCH 16, 2023

Dear Commissioner:

In response to the Final Office Action mailed on March 16, 2023, Applicant submits the following Response. The Applicant respectfully requests that this Response to the Final Office Action be entered into the record of the above-captioned patent application.

The Applicant's **Amendments to the Specification** are presented on page 2 of this paper.

The Applicant's **Amendments to the Drawings** are presented on page 4 of this paper.

The Applicant's **Listing of Claims** is presented on page 5 of this paper.

The Applicant's **Remarks** begin on page 12 of this paper.

AMENDMENT TO SPECIFICATION:

Please amend the specification as follows. A Marked-Up version of the specification and a Clean version of the specification are attached that take into account the amendments below:

- Please amend paragraph [0049] that defines reference numeral "9" to include the word "portion" after "top", as follows:

  -- [0049] 9-Recycling Container Top Portion --

- Please amend paragraph [0081] to specifically mention the container top portion, the container inlet conduit, the main body, and the interior volume of the detachable recycling container, as follows:

  -- [0081] 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 on the container top portion 9 for target particle separation by sedimentation. After the effluent passes through the inlet port 15 and through the container inlet conduit in the interior volume of the main body of the detachable recycling container 12, solids ~~Solids~~ settle and accumulate in the bottom of the interior volume of the main body of the ~~Recycle~~ detachable recycling 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 on the container top portion 9. --

- Please amend paragraph [0084] to specifically mention the radially protruding structures of the detachable recycling container, as follows:

  -- [0084] The system is provided with a simple back plate 1 for easy dental office placement as well as removable retaining pins 13 that engage radially protruding structures of the detachable recycling container to ensure the recycling container does not detach from the air-water separation tank 5 when there is no vacuum in the system. --

- Please amend paragraph [0086] to specifically mention the generally cylindrical upper region of the container top portion, as follows:

  -- [0086] 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 generally cylindrical upper region of the container top portion 9 to enable the addition of a liquid tight top for shipping. --

- Please amend paragraph [0088] to specifically mention the central axis of the main body of the recycling container, as follows:

  -- [0088] Figure 4a 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 19 on the recycling container 12 above a flange structure 22 that protrudes radially away from the central axis of the main body of the recycling container 12. The removable retaining pins 13, described above with respect to Figure 2, fit within the region below the flange structure 22. 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. --

- Please amend paragraph [0089] to specifically mention the circular upper surface of the container top portion, as follows:

  -- [0089] Figure 6 through Figure 11 show several embodiments of irregular keyways 23 on a recycling container. The inlet port 15 and the outlet port 16 are on the circular upper ~~top mating~~ surface of the container top portion, and the irregular keyways 23 are cast into the outer top mating surface. --

AMENDMENT TO DRAWINGS:

Please make the following amendments to the drawings. The Applicant has submitted a clean Replacement Drawing Set that takes into account these changes:

- In FIGURE 1, please elongate the reference line for container top portion 9 so that the reference line extends further into the container top portion 9.
- In FIGURE 4B, please add reference numeral "9" to identify the container top portion 9.
- In FIGURE 5B, please add reference numeral "9" to identify the container top portion 9.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/965,556	Filing Date 10/13/2022	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	03/22/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 23	= 0		x $40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $192 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	PSS
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/FIKIRTE A GEREMEW/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

80709 7590 03/16/2023

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

EXAMINER	
LUCCHESI, NICHOLAS D	

ART UNIT	PAPER NUMBER
3772	

NOTIFICATION DATE	DELIVERY MODE
03/16/2023	ELECTRONIC

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

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

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

srlpatents@aol.com

Office Action Summary	Application No. 17/965,556	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 --

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 2/7/23.

☐ 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) 13-35 is/are pending in the application.

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

6) ☑ Claim(s) 13-18 and 20-21 is/are allowed.

7) ☑ Claim(s) 19 and 22-35 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 2/7/23 is/are: a)☐ accepted or b)☑ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

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 are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the o-rings as recited in claim 22 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The specification does not describe certain elements as recited in the claims. Examples are the specifics of the cap as recited in claim 27, as well as the claim terms "main body, central axis, interior volume, container top portion, cylindrical, upper region, circular, radially protruding structure, pin engaging surfaces, inlet conduit. Applicant is advised to review the specification to make sure that it provides antecedent basis for claim terminology.

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 19,22-35 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 applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

In claim 19, line 3, --effluent-- should be inserted after "dental amalgam".

In claim 22, line 3, --dental-amalgam—should be inserted after "detachable".

In claim 23, line 5, --dental-amalgam—should be inserted after "detachable".

In claim 25, line 18, --dental-amalgam—should be inserted after "detachable".

In claim 31, line 5, --dental-amalgam—should be inserted after "detachable".

In claim 32, line 4, --dental-amalgam—should be inserted after "detachable".

Allowable Subject Matter

Claims 13-18,20,21 are allowed.

Claims 19,22-35 would be allowable if rewritten or amended 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.

The following is a statement of reasons for the indication of allowable subject matter: The claims in this application have not been rejected with prior art because the prior art of record fails to disclose either singly or in combination, the detachable dental amalgam container as recited in the independent claims, including the at least one radially protruding structure as described and which receives at least one retaining pin when attached to a dental amalgam separation system, as recited.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICHOLAS D LUCCHESI whose telephone number is (571)272-4977. The examiner can normally be reached 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, Jacqueline Johanas can be reached on 571-270-5085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NICHOLAS D LUCCHESI/
Primary Examiner, Art Unit 3772

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	Mozzicato et al.
	Examiner	Art Unit
	NICHOLAS D LUCCHESI	3772

CPC - Searched*		
Symbol	Date	Examiner
A61C 17/065; A61M 1/64; B01D 21/2444; B65D 43/0231, 2543/00092	01/13/2023	NL
search updated	03/08/2023	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
Assignee Search; Inventor Search	01/13/2023	NL
search updated	03/08/2023	NL

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

/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	11	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/01/13 11:10 PM
L2	20	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/01/13 11:22 PM
L3	209	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:23 PM
L4	153	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L5	1014	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L6	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L7	669	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L8	4544	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:25 PM
L9	6164	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:25 PM
L10	73	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:26 PM
L11	226	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:31 PM
L12	39	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:32 PM
L13	45	L11 AND flange	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:32 PM
L14	14	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/03/08 02:57 PM
L15	21	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/03/08 02:57 PM
L16	212	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L17	158	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM

L18	1024	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L19	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L20	682	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L21	4580	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L22	6222	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L23	75	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L24	229	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L25	40	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM
L26	46	L11 AND flange	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/03/08 02:57 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

80709 7590 02/14/2023

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

EXAMINER	
LUCCHESI, NICHOLAS D	

ART UNIT	PAPER NUMBER
3772	

NOTIFICATION DATE	DELIVERY MODE
02/14/2023	ELECTRONIC

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

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

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

srlpatents@aol.com

Applicant-Initiated Interview Summary	**Application No.** 17/965,556	**Applicant(s)** Mozzicato et al.		
	Examiner NICHOLAS D LUCCHESI	**Art Unit** 3772	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
NICHOLAS D LUCCHESI	Primary Examiner	Telephonic
Steven Lazar	Attorney	
Dan Burnham	Attorney	

Date of Interview: 06 February 2023

Issues Discussed:

35 U.S.C. 112

Discussing held regarding proposed amendment to overcome the outstanding rejection. Proposed amendment attached herewith, which will be fully considered upon filing of a formal amendment.

Drawings

Discussion held regarding proposed drawing changes to clarify and remedy various outstanding objections raised in the previous office action. These will be fully considered upon filing of a formal amendment. See proposed changes, attached.

/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

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

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

PROPOSED AMENDMENT TO INDEPENDENT CLAIM 13
FOR DISCUSSION DURING INTERVIEW ON FEBRUARY 6, 2023 AT 11:00ET

13. (Proposed Amendment) A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on ~~upstream from~~ the system outlet for ~~drawing~~ moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin ~~a pair of retaining pins~~ for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including at least one radially protruding structure ~~structures~~ located below the ~~upper~~ generally cylindrical upper region, the at least one radially protruding structure ~~structures defining pin-engaging surfaces~~ for engaging the at least one ~~pair of~~ retaining pin ~~pins~~ of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, the at least one radially protruding structure ~~pair of pin-engaging surfaces~~ being located radially outward ~~from~~ relative to the periphery of the circular upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove ~~for removing~~ fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is ~~drawn~~ moved toward the container outlet port due to the vacuum source.

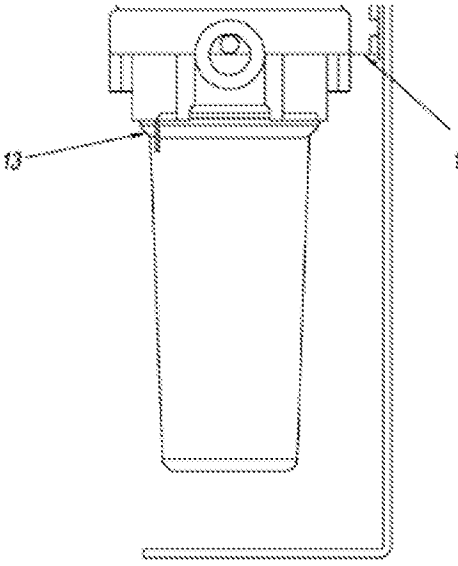


FIG. 2

FIG. 2 SHOWING THE PIN 13 TO RETAIN CONTAINER 12 WITHIN TANK 5 OF SYSTEM; UPPER PORTION OF CONTAINER 12 ABOVE TAPERED SURFACE IS NOT VISIBLE

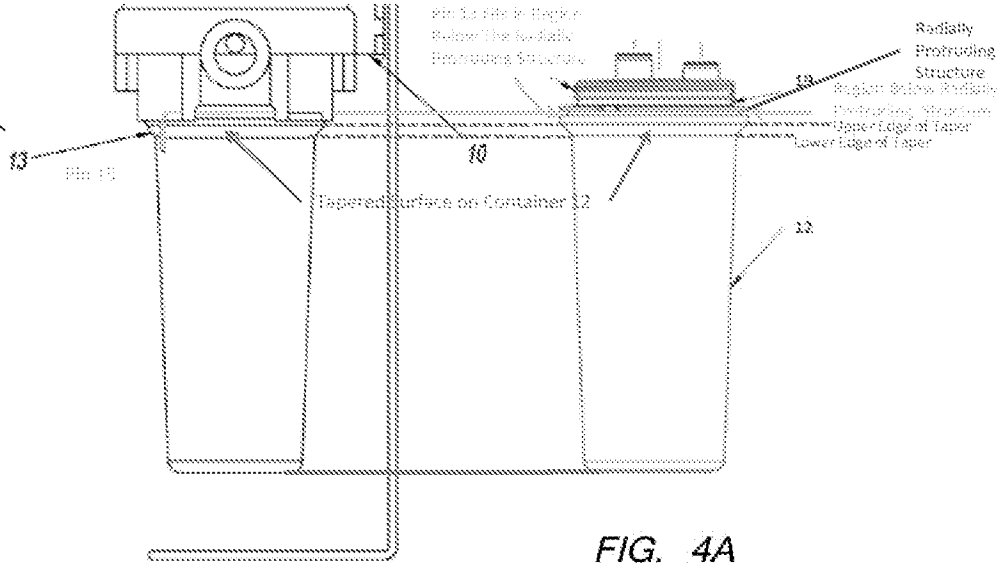


FIG. 4A

FIG. 2

ANNOTATED FIG. 2 HIGHLIGHTING THE PIN 13 IN ORANGE TO SHOW RELATIVE POSITION ON CONTAINER 12 IN FIG. 4A; UPPER PORTION OF CONTAINER 12 ABOVE TAPERED SURFACE IS NOT VISIBLE

FIG. 4A ILLUSTRATES THE UPPER PORTION OF CONTAINER 12 WITH THE RADIALLY PROTRUDING STRUCTURE; THE PIN 13 FITS IN THE REGION BELOW THE RADIALLY PROTRUDING STRUCTURE

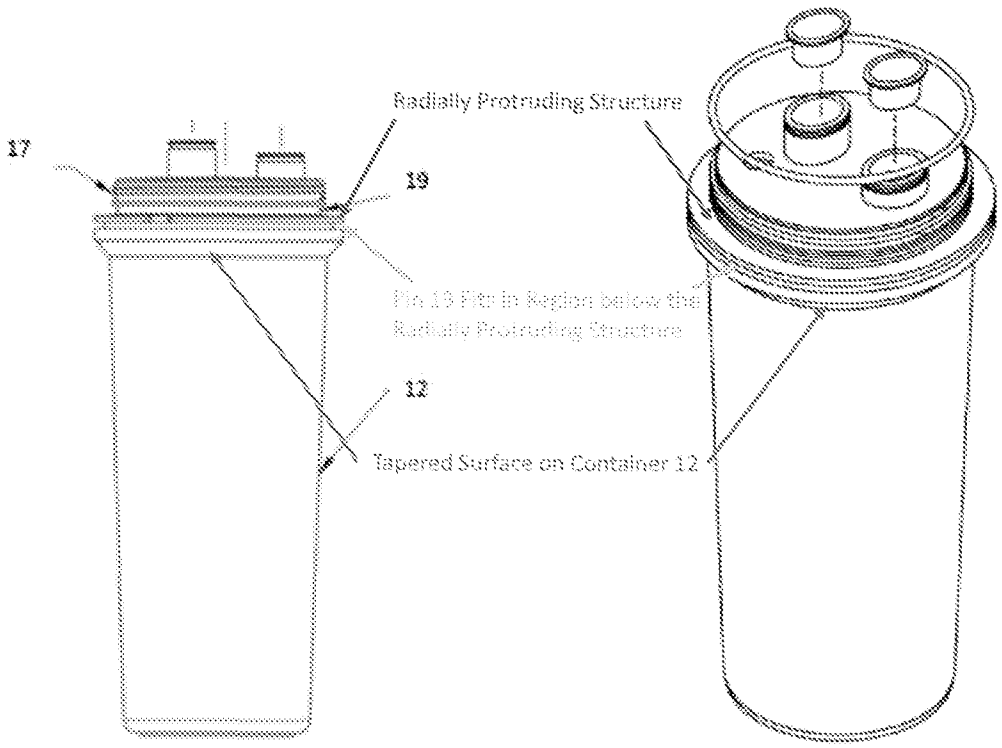

17
Radially Protruding Structure
19
Fig. 19 Fits in Region below the Radially Protruding Structure
12
Tapered Surface on Container 12

FIG. 4A

FIG. 4B

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
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2

CONFIRMATION NO. 8686

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

PUBLICATION NOTICE

OC00000137367984

Title: Detachable Recycling Container

Publication No.US-2023-0038660-A1
Publication Date:02/09/2023

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

LISTING OF CLAIMS:

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

1-12. (Cancelled)

13. (Currently Amended) A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on ~~upstream from~~ the system outlet for ~~drawing~~ moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin ~~a pair of retaining pins~~ for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including at least one radially protruding structure ~~structures~~ located below the ~~upper~~ generally cylindrical upper region, the at least one radially protruding structure ~~structures defining pin-engaging surfaces~~ for engaging the at least one ~~pair of~~ retaining pin ~~pins~~ of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, the at least one radially protruding structure ~~pair of pin-~~

~~engaging surfaces~~ being located radially outward ~~from~~ relative to the periphery of the circular upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove ~~for removing~~ fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is ~~drawn~~ moved toward the container outlet port due to the vacuum source.

14. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the container inlet port and the container outlet port extend above the circular upper surface by the same height.

15. (Previously Presented) The detachable dental-amalgam container of claim 13, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container.

16. (Currently Amended) The detachable dental-amalgam container of claim 15, further including a cap configured to retain ~~that retains~~ at least one of the plugs on the filled detachable dental-amalgam container.

17. (Previously Presented) The detachable dental-amalgam container of claim 16, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.

18. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the container top portion has a maximum outer dimension that is greater than a maximum outer diameter of the main body.

19. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the container outlet port is configured for fluidic coupling to the system outlet of the dental amalgam separation system that transfers fluid from the dental amalgam to a municipal water disposal system.

20. (Currently Amended) The detachable dental-amalgam container of claim 13, wherein the at least one radially protruding structure includes ~~structures include~~ a flange extending in a direction away from the generally cylindrical upper region.

21. (Currently Amended) The detachable dental-amalgam container of claim 20 ~~21~~, wherein the flange extends entirely around the container top portion.

22. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein each of the container inlet port and the container outlet port has an external O-ring at an upper portion thereof, the O-rings configured to help to provide a seal between the detachable container and the dental amalgam separation system when a suction pressure is applied to the system outlet by the vacuum source.

23. (Previously Presented) The detachable dental-amalgam container of claim 13, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the circular upper surface, the detachable container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

24. (Previously Presented) The detachable dental-amalgam container of claim 23, wherein the keying feature includes a recess formed in an outermost periphery of the container top portion.

25. (Currently Amended) A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source for moving ~~upstream from the system outlet for drawing~~ fluid from the dental amalgam effluent through the system outlet, and at least one retaining pin ~~a pair of retaining pins~~ for use with the detachable container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the ~~circular~~ upper surface than the container outlet port, the container inlet port and the container outlet port ~~outlet port~~ both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move ~~draws~~ fluid from the dental amalgam effluent toward the system outlet, the container top portion further including at least one radially protruding structure ~~structures~~ located below the ~~upper~~ generally cylindrical upper region, the at least one radially protruding structure ~~structures having lower surfaces~~ defining a pin-receiving region therebelow ~~regions~~ for receiving the at least one ~~pair of~~ retaining pin ~~pins~~ of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is ~~lower surfaces that define the pin-~~

~~receiving regions are~~ located radially outward from the periphery of the upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is ~~drawn~~ moved from the interior volume of main body, through ~~into~~ the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system ~~upstream from the system outlet~~.

26. (Previously Presented) The detachable dental-amalgam container of claim 25, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap that retains at least one of the plugs on the filled detachable dental-amalgam container.

27. (Previously Presented) The detachable dental-amalgam container of claim 26, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.

28. (Currently Amended) The detachable dental-amalgam container of claim 25, wherein the at least one radially protruding ~~structures~~ structure includes ~~include~~ a flange extending away from the generally cylindrical upper region.

29. (Previously Presented) The detachable dental-amalgam container of claim 28, wherein the flange extends entirely around the container top portion.

30. (Currently Amended) The detachable dental-amalgam container of claim 28 ~~25~~, wherein the flange includes a curved outer surface. ~~container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the upper surface, the detachable container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.~~

31. (Currently Amended) A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, a system outlet, a vacuum source ~~upstream from the system outlet~~ for moving ~~drawing~~ fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin ~~a pair of retaining pins~~ for use with the detachable container, the detachable dental-amalgam container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the dental amalgam separation system;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having ~~an~~ a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including at least one radially protruding structure ~~structures~~ located below the upper generally cylindrical region, the at least one radially protruding structure having a lower surface under which ~~surfaces defining pin-receiving regions for receiving~~ the at least one ~~pair of~~ retaining pin ~~pins~~ of the dental amalgam separation system is received to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward relative to the periphery of the circular upper surface; and

wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and

wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is ~~drawn~~ moved from the interior volume of main body, through ~~into~~ the container outlet port, and into the system outlet due to the vacuum source acting on the dental amalgam separation system ~~upstream from the system outlet~~.

32. (Previously Presented) The detachable dental-amalgam container of claim 31, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region, the detachable container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

33. (New) The detachable dental-amalgam container of claim 31, wherein the at least one radially protruding structure includes a flange extending away from the generally cylindrical upper region, the flange includes a curved outer surface.

34. (New) The detachable dental-amalgam container of claim 33, wherein the flange extends entirely around the container top portion.

35. (New) The detachable dental-amalgam container of claim 33, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap configured to retain at least one of the plugs on the filled detachable dental-amalgam container.

REMARKS

Claims 13-35 remain in the application for further prosecution. Claim 13, 16, 20, 21, 25, 28, 30, and 31 are presently being amended. Claims 33-35 are being added. No new matter is being added.

Examiner Interview on February 6, 2023

The Applicant appreciates the Examiner's time and effort in conducting the interview on February 6, 2023 to discuss the drawing objections and the rejections under 35 U.S.C. §112. Pursuant to the discussions with the Examiner, the Applicant is now submitting a Replacement Drawing Set, a Marked-Up Specification, and a Clean Specification. Furthermore, Applicant now submits the amendment to independent claim 13 that was discussed with the Examiner. Similar amendments to independent claims 25 and 31 are also now being submitted.

Drawing Objections

The Applicant respectfully suggests that the initial drawings illustrated the features in the pending claims. The Applicant is now submitting a Replacement Drawing Set that make the following changes:

- In FIGURE 2, the reference line for the pin 13 was changed from an arrowed lead line to a straight lead line that touches vertical segment of the pin 13, as discussed with the Examiner during the interview.
- FIGURES 3A and 3B previously had no reference numerals. As requested by the Examiner, reference numeral "25" has now been added to identify the adapter 25.
- In FIGURE 4A, reference numerals "15", "16", and "22" were added to identify the container inlet port 15, container outlet port 16, and the flange structure 22, respectively.
- FIGURE 4B previously had no reference numerals. As requested by the Examiner, reference numerals "12", "15", "16", "18", "19", "20", "21" and "22" have now been added to identify the container 12, the container inlet port 15, the container outlet port 16, the cap 18, the O-ring groove 19, the plugs 20, the O-ring 21, and the flange structure 22, respectively.

- In FIGURE 5A, reference numeral "17" was changed to reference numeral "18" to properly identify the cap 18.
- FIGURES 6A, 6B, 7A, 7B, 8A, 8B, 9A, and 9B have now been deleted, as discussed with the Examiner.
- Due to the former FIGURES 6-9 being deleted, FIGURES 10A, 10B, 11A, 11B, 12A, 12B, 13A, 13B, 14A, 14B, 15A, and 15B have now been renumbered. Further, these figures previously had no reference numerals. As requested by the Examiner, in each of these figures, reference numerals "15", "16", and "23" have been added to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

Within these drawings changes, the only new reference numerals being added are for the flange structure 22, the keyways 23, and the adapter 25. Because the original drawings and specification previously disclosed these features, no new matter has been added by these drawing changes. Furthermore, the amendments to the specification to account for these drawing changes are also consistent with the originally filed drawings and specification and, therefore, no new matter has been added by these amendments to the specification.

Section 112 Rejections

Claims 13-32 have been rejected under 35 U.S.C. §112 with the rejections primarily focusing on the removable retaining pins 13 and the flange structure 22, which is located directly below the O-ring groove 19, as seen best in FIGURE 4A.

As explained during the interview, the horizontal segment of the L-shaped retaining pin 13 illustrated in FIGURE 2 fits within the region directly below the flange structure 22, which radially protrudes away from the central axis of the container 12 as shown in FIGURES 4A and 4B. The present specification explains that the "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." Para. [0092]. To remove it, the removable retaining pin 13 is pulled in the left direction in FIGURE 2 such that the horizontal segment of the pin 13 is removed from the region directly below the flange structure 22 on the recycling container 12, and the recycling container 12 can then be released from the dental amalgam separation system. As such, the Applicant respectfully

suggests that the present application describes the claimed subject matter in a way that would permit the skilled artisan to make and use the invention.

Consequently, the Applicant believes that all of the pending claims meet the requirements of 35 U.S.C. §112.

Conclusion

Applicant submits that the claims are in a condition for allowance and action toward that end is earnestly solicited. If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact Applicant's undersigned attorney at the number indicated.

It is believed that no fees are due; however, should any fees be required (except for payment of the issue fee), the Commissioner is requested to contact the undersigned attorney for Applicant.

Respectfully submitted,

Date: February 7, 2023

By: /Steven R. Lazar/
Steven R. Lazar
Attorneys for Applicant
Registration No. 32,618

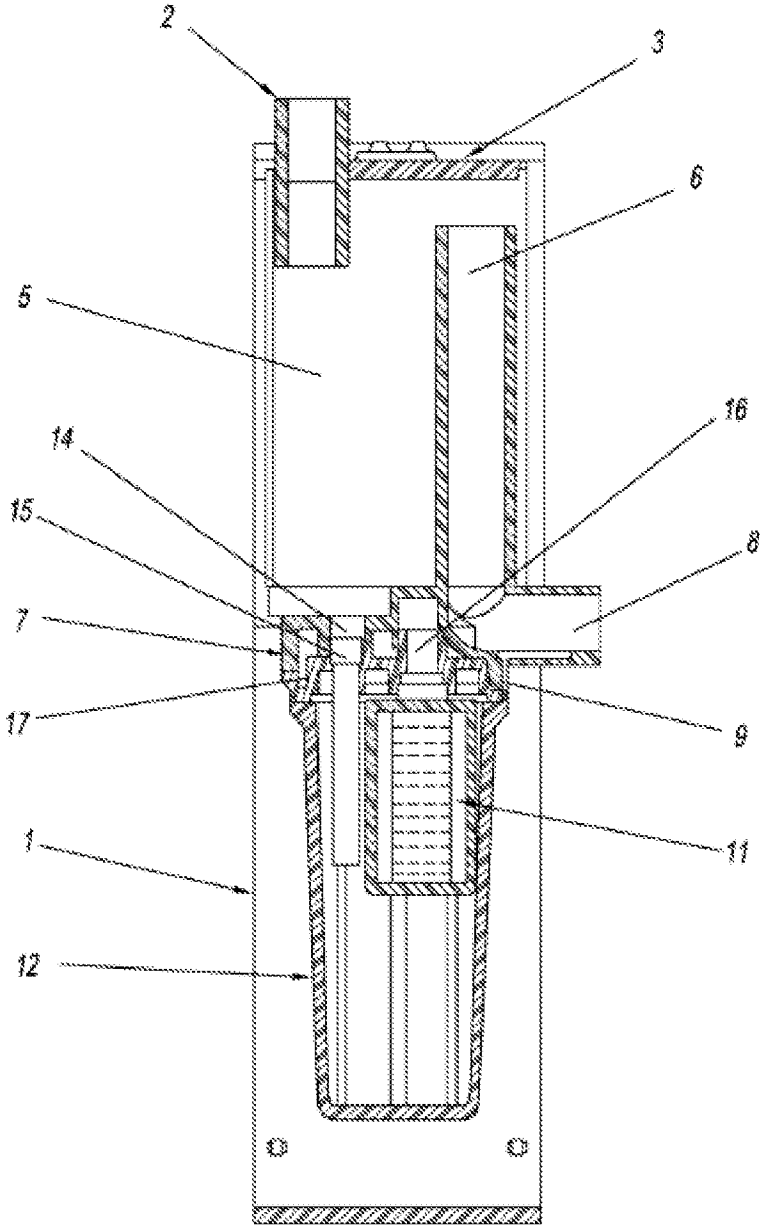


FIG. 1

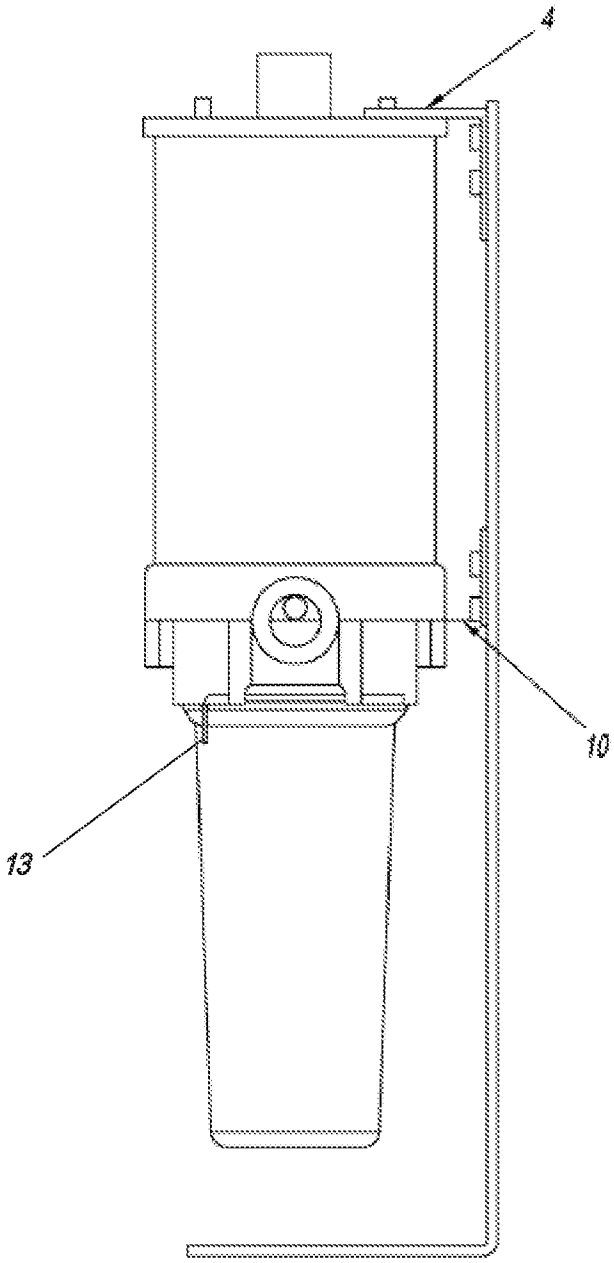


FIG. 2

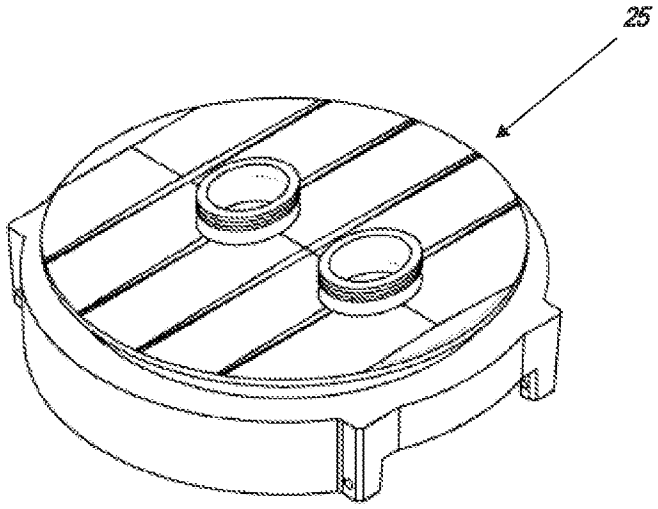


FIG. 3A

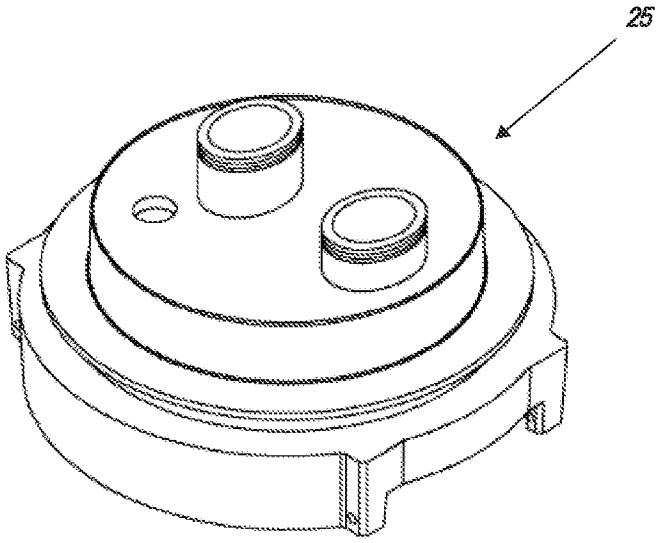


FIG. 3B

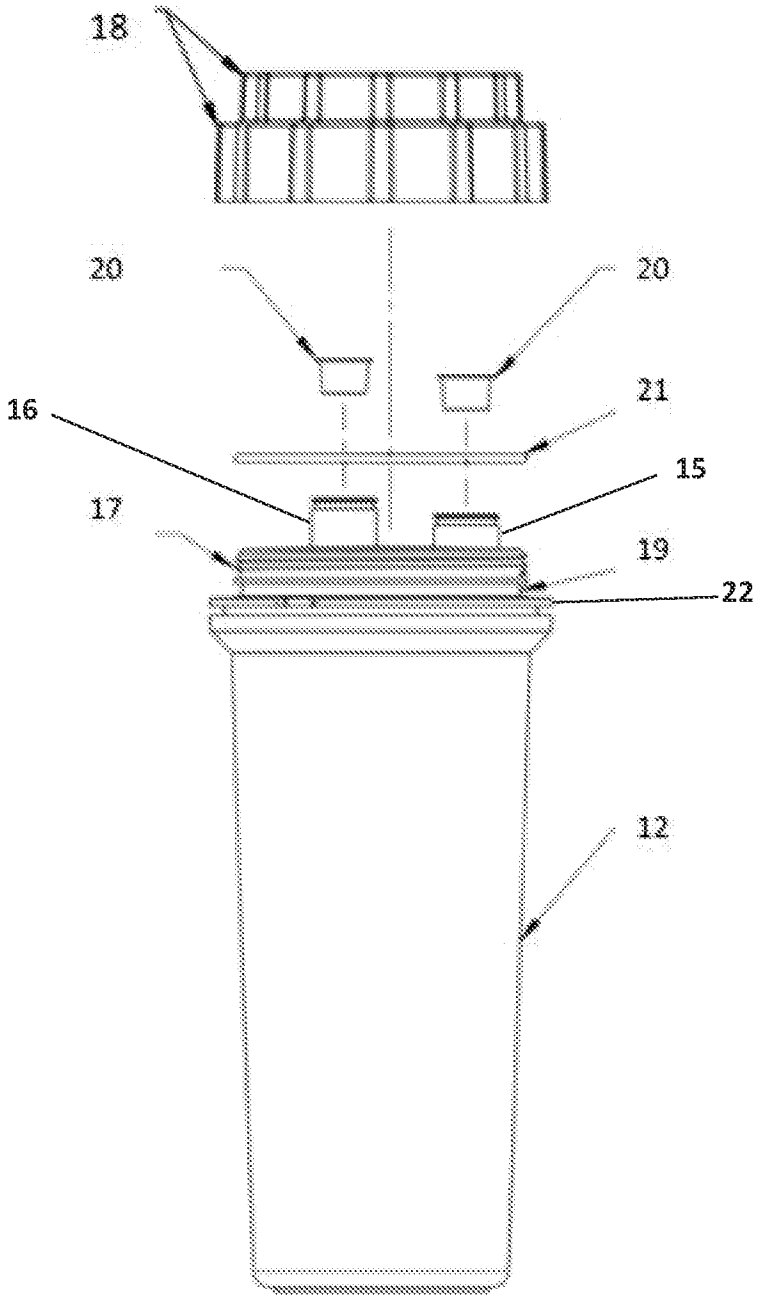


FIG. 4A

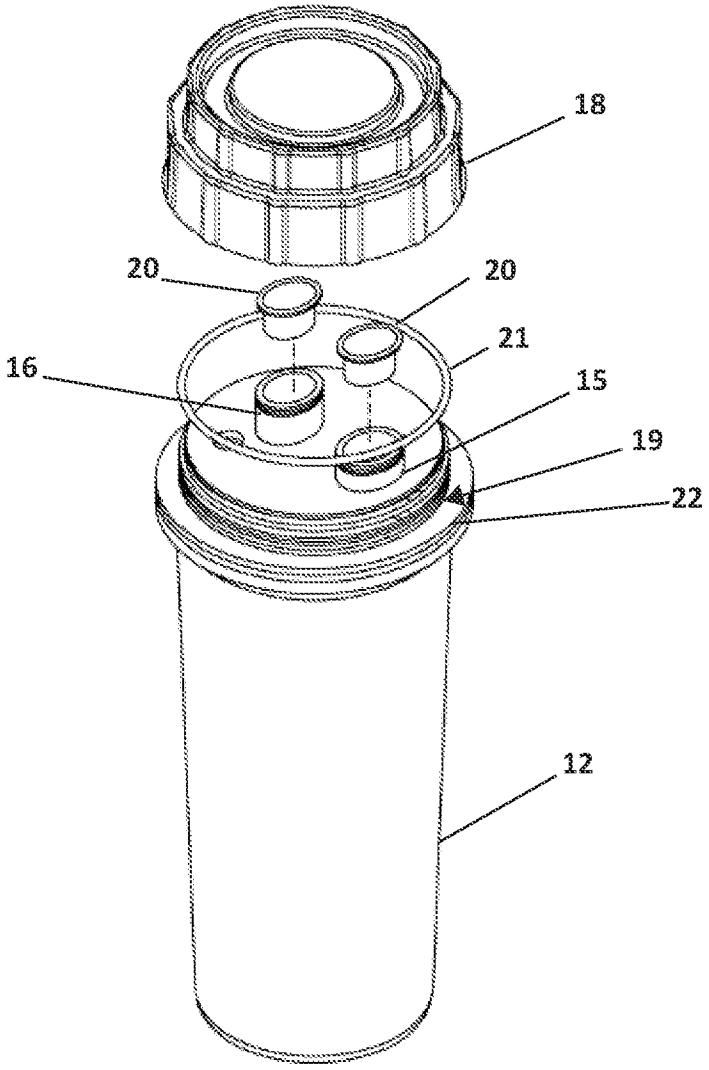


FIG. 4B

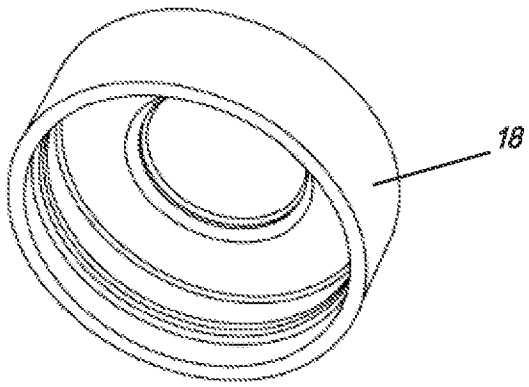


FIG. 5A

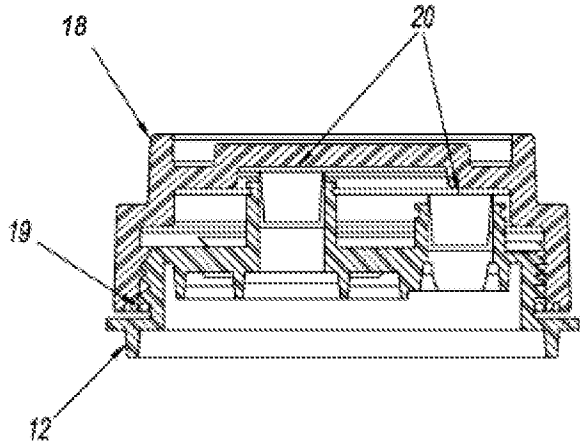


FIG. 5B

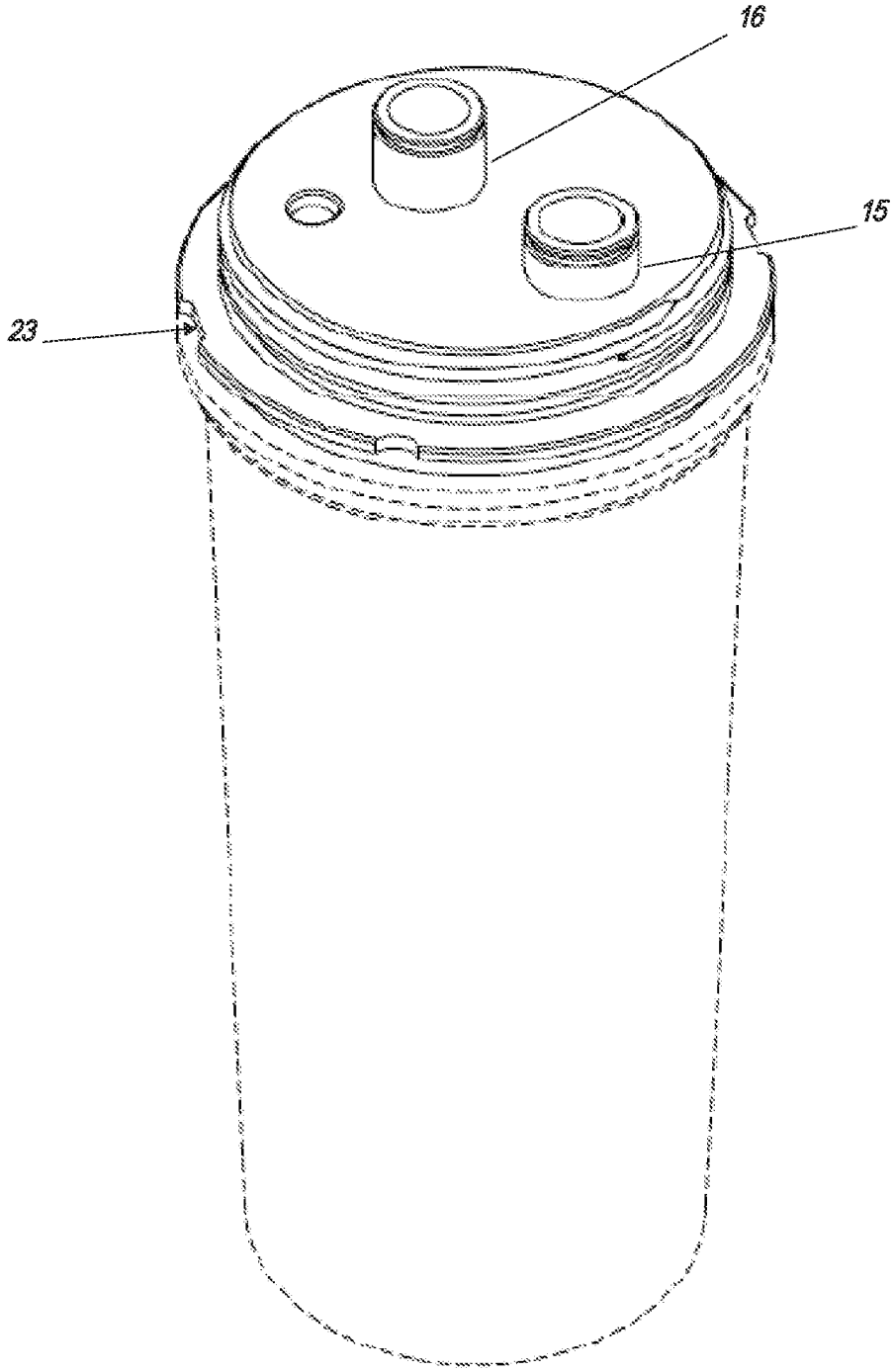


FIGURE 6A

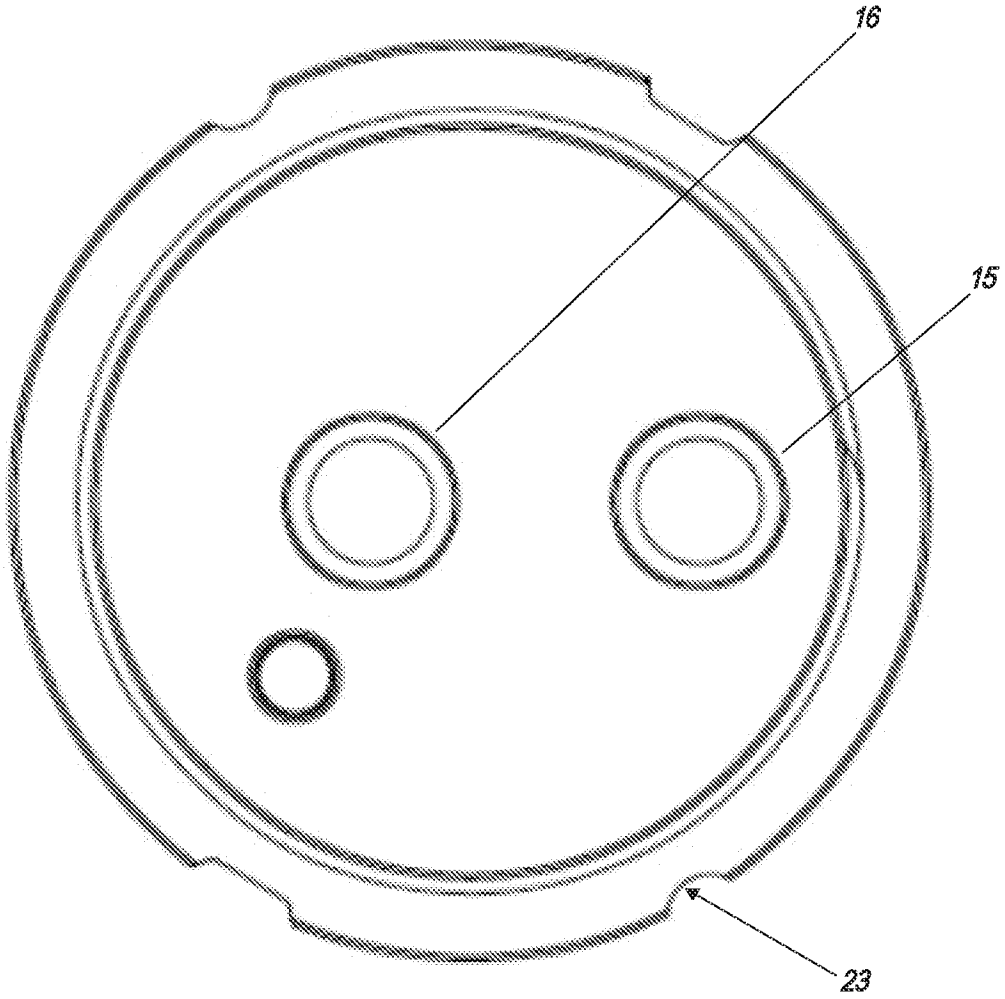


FIGURE 6B

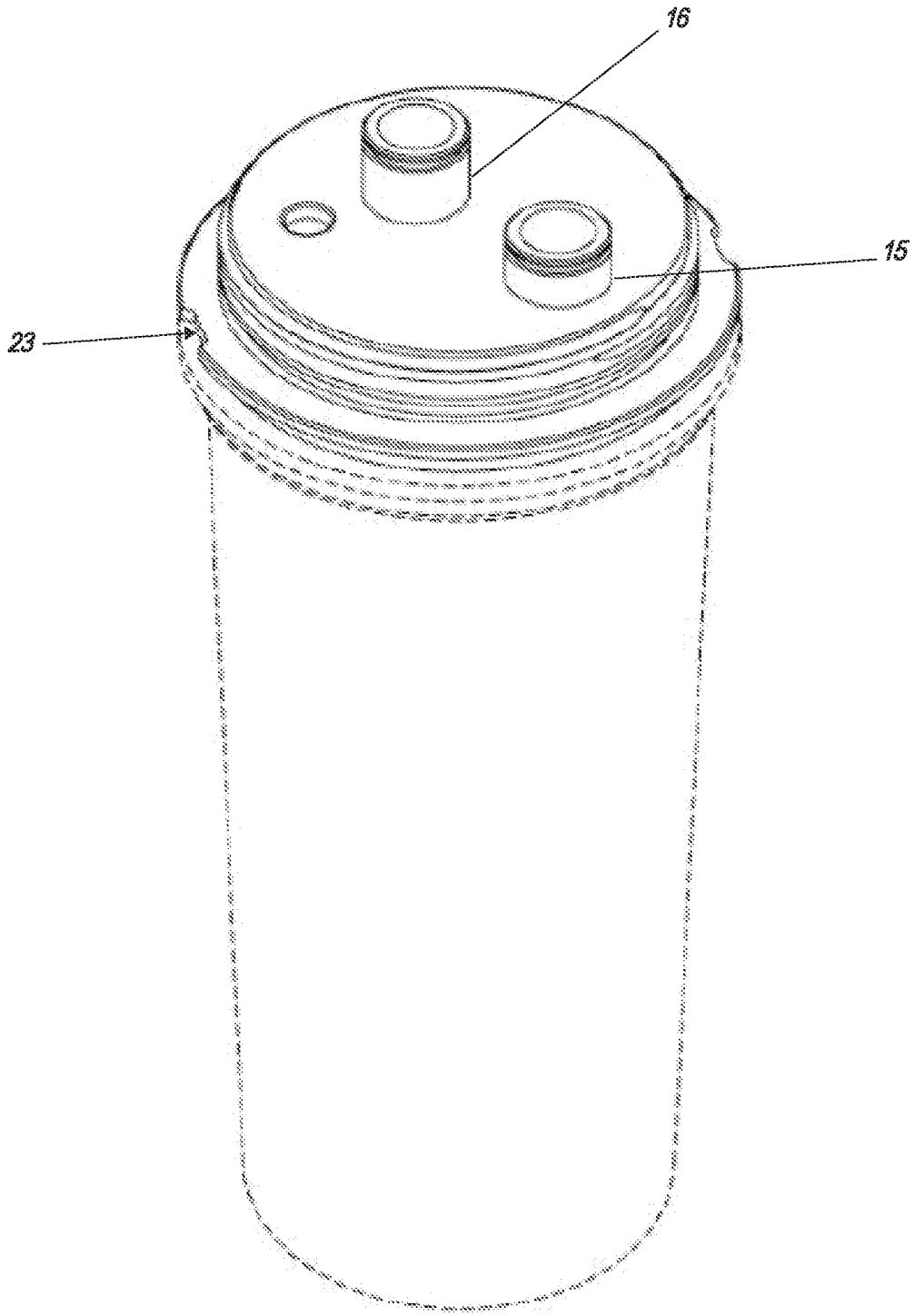


FIGURE 7A

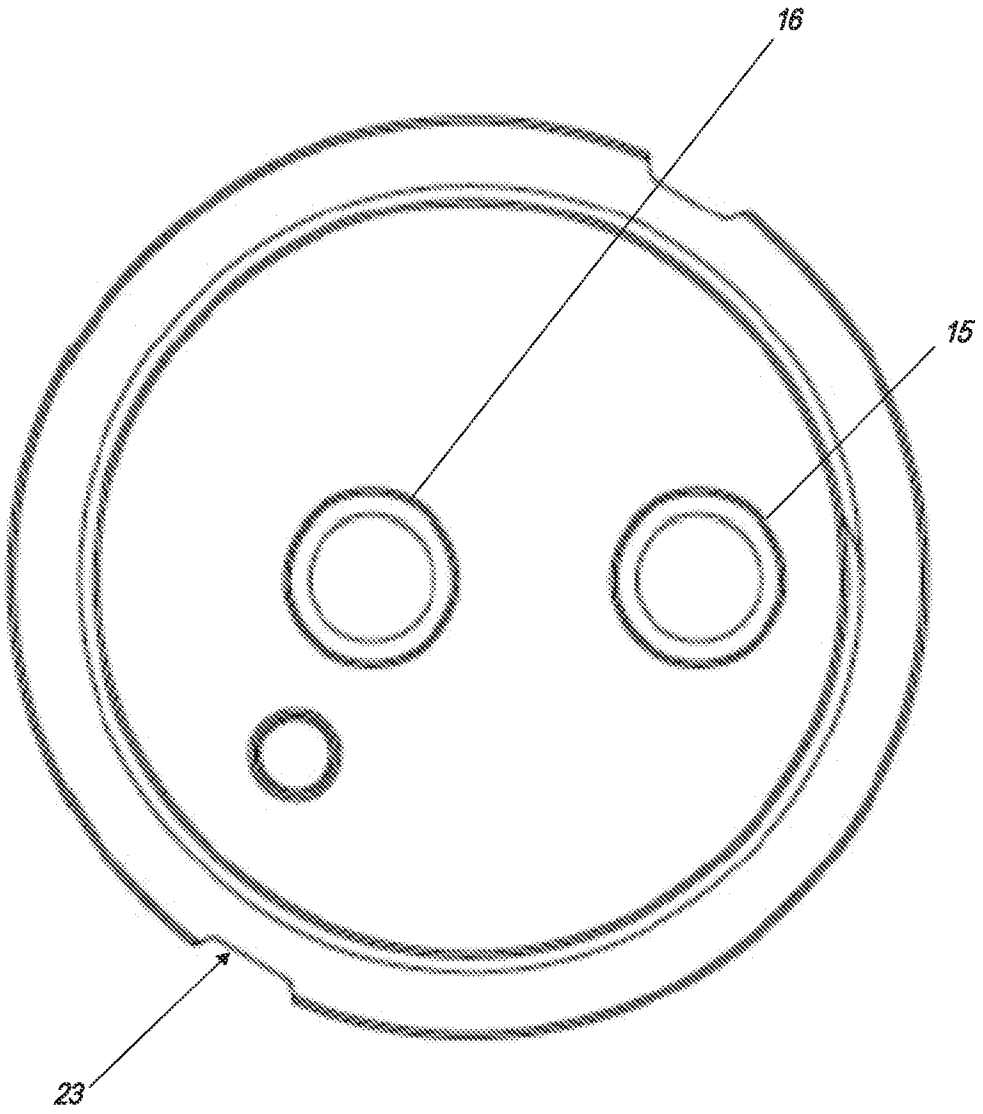


FIGURE 7B

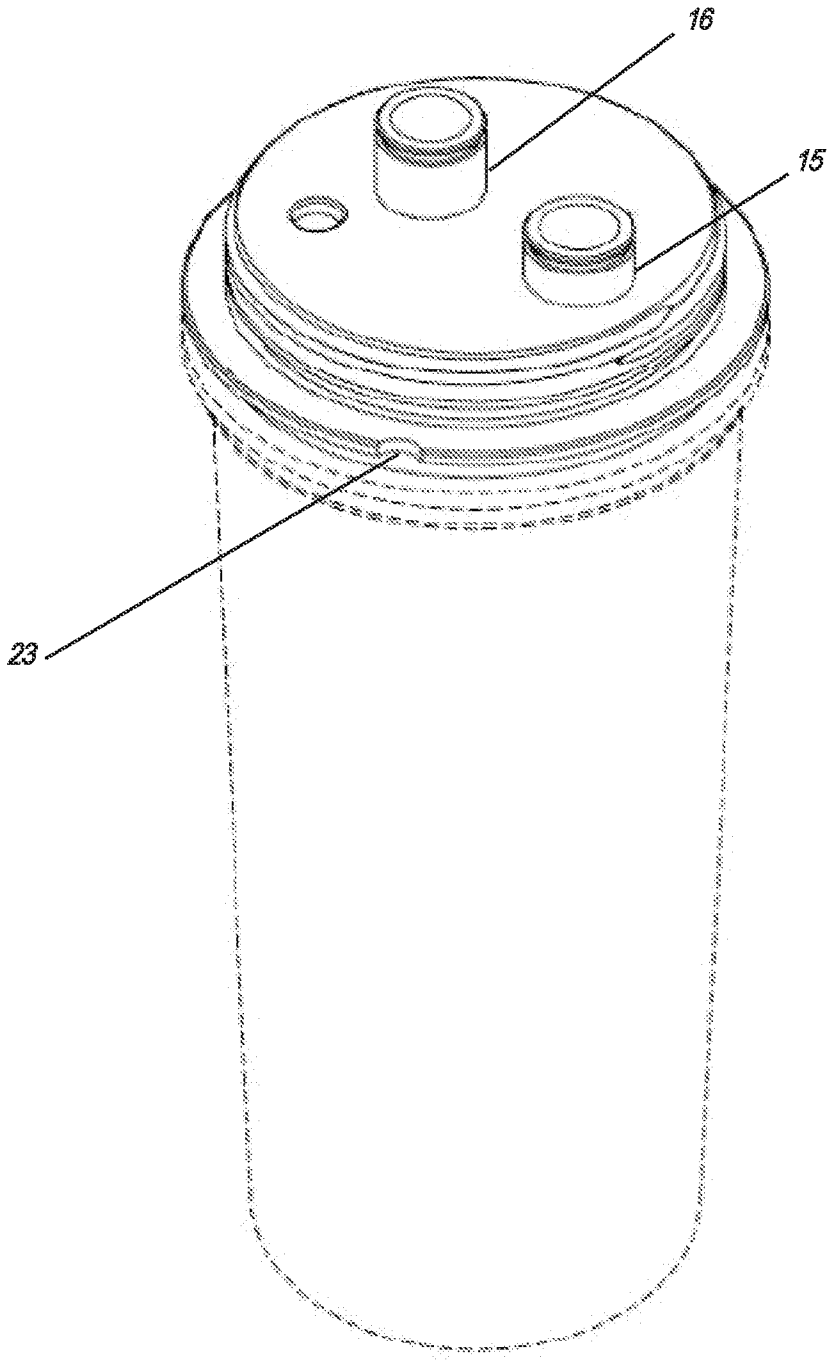


FIGURE 8A

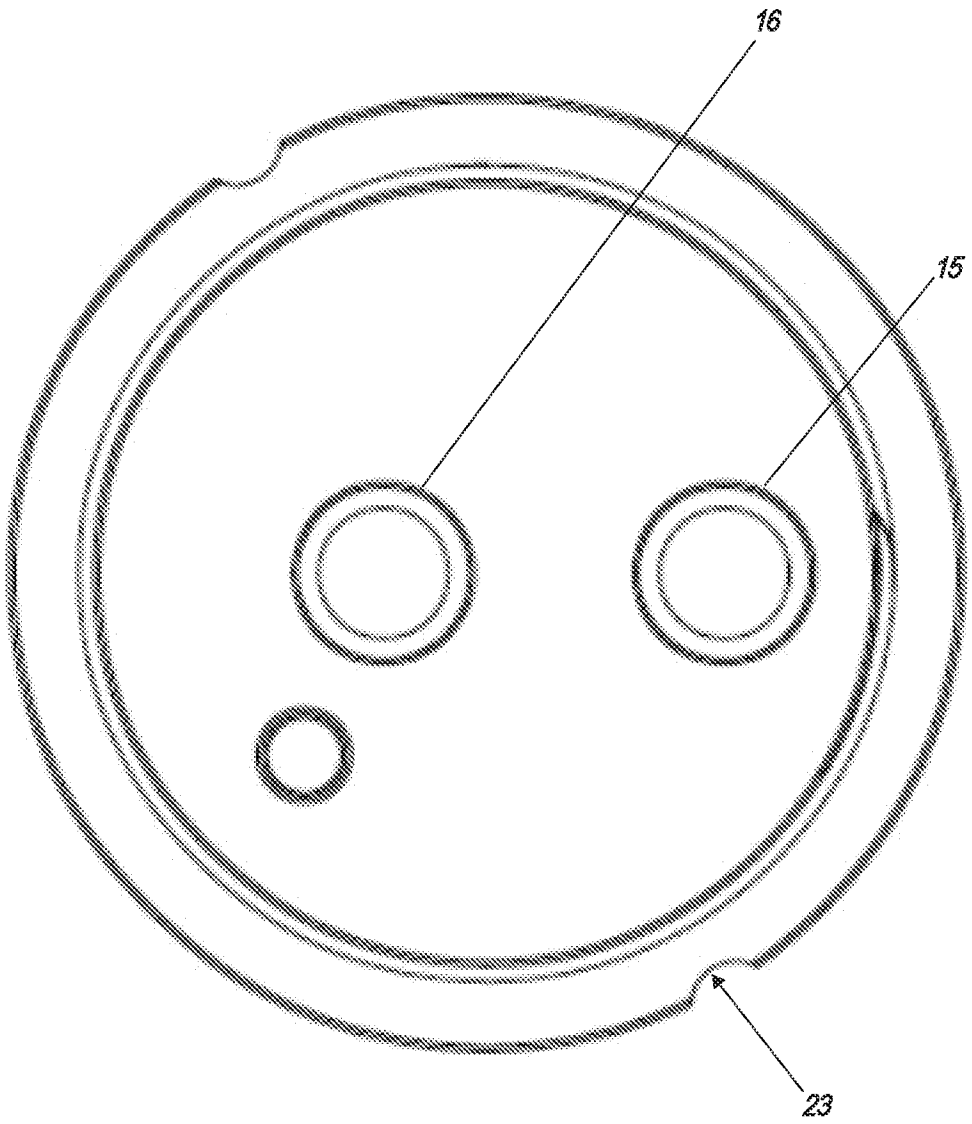


FIGURE 8B

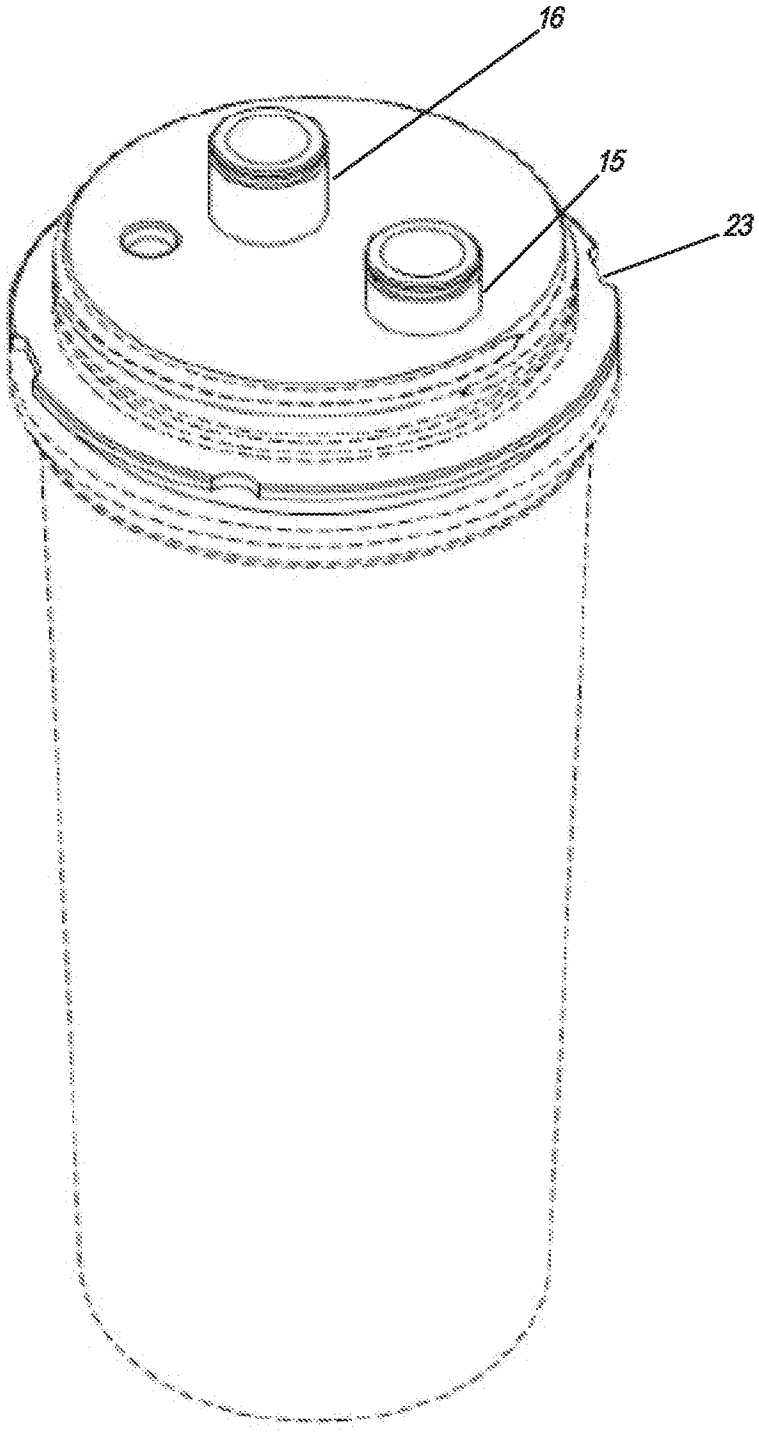


FIGURE 9A

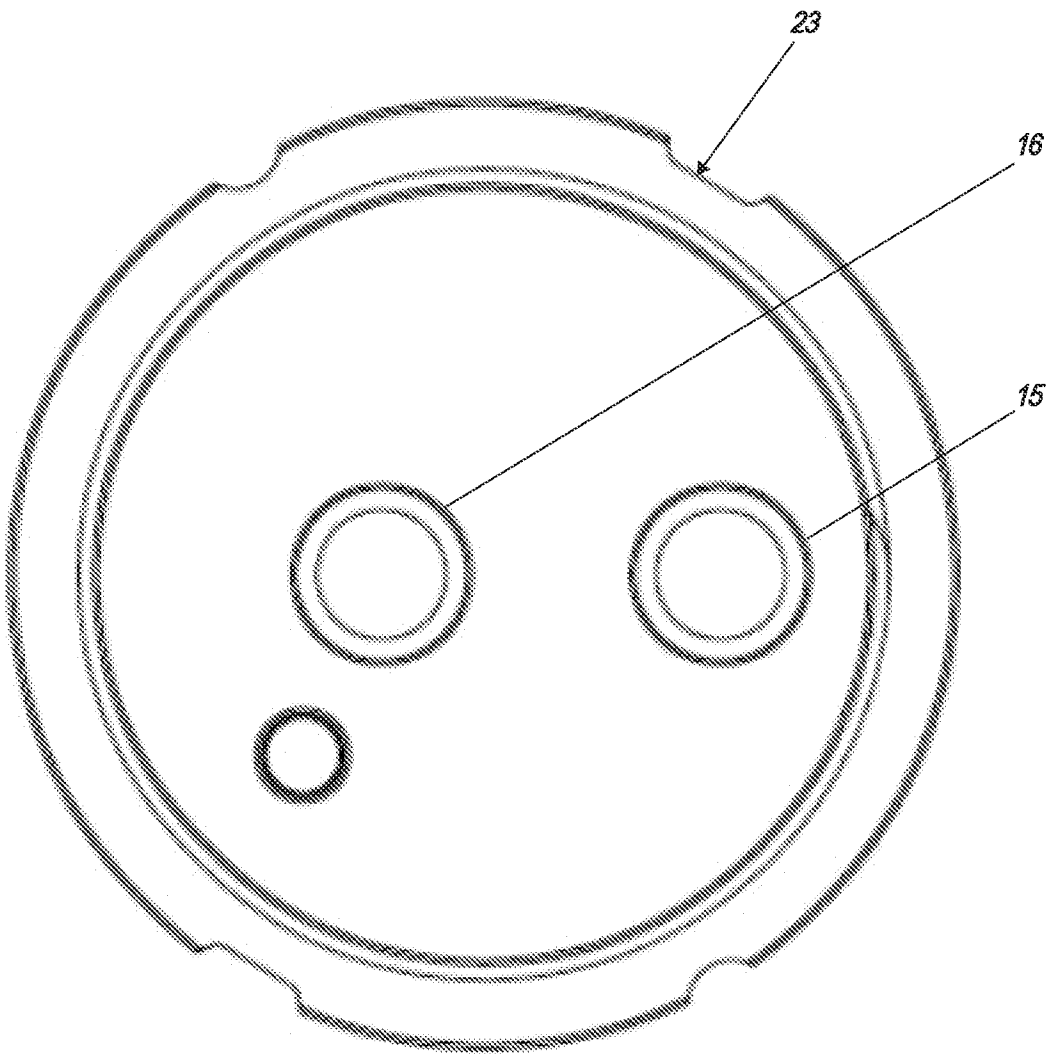


FIGURE 9B

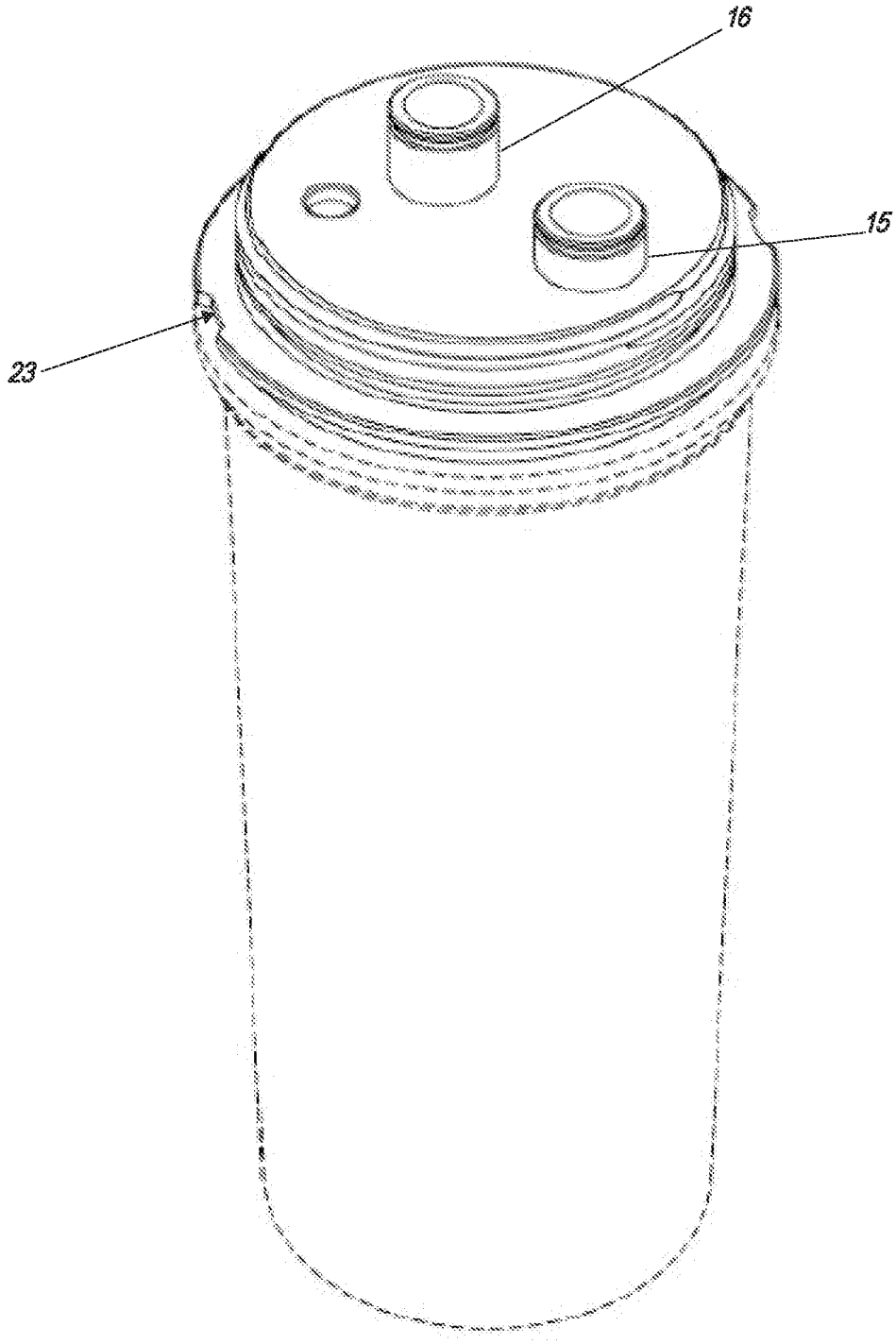


FIGURE 10A

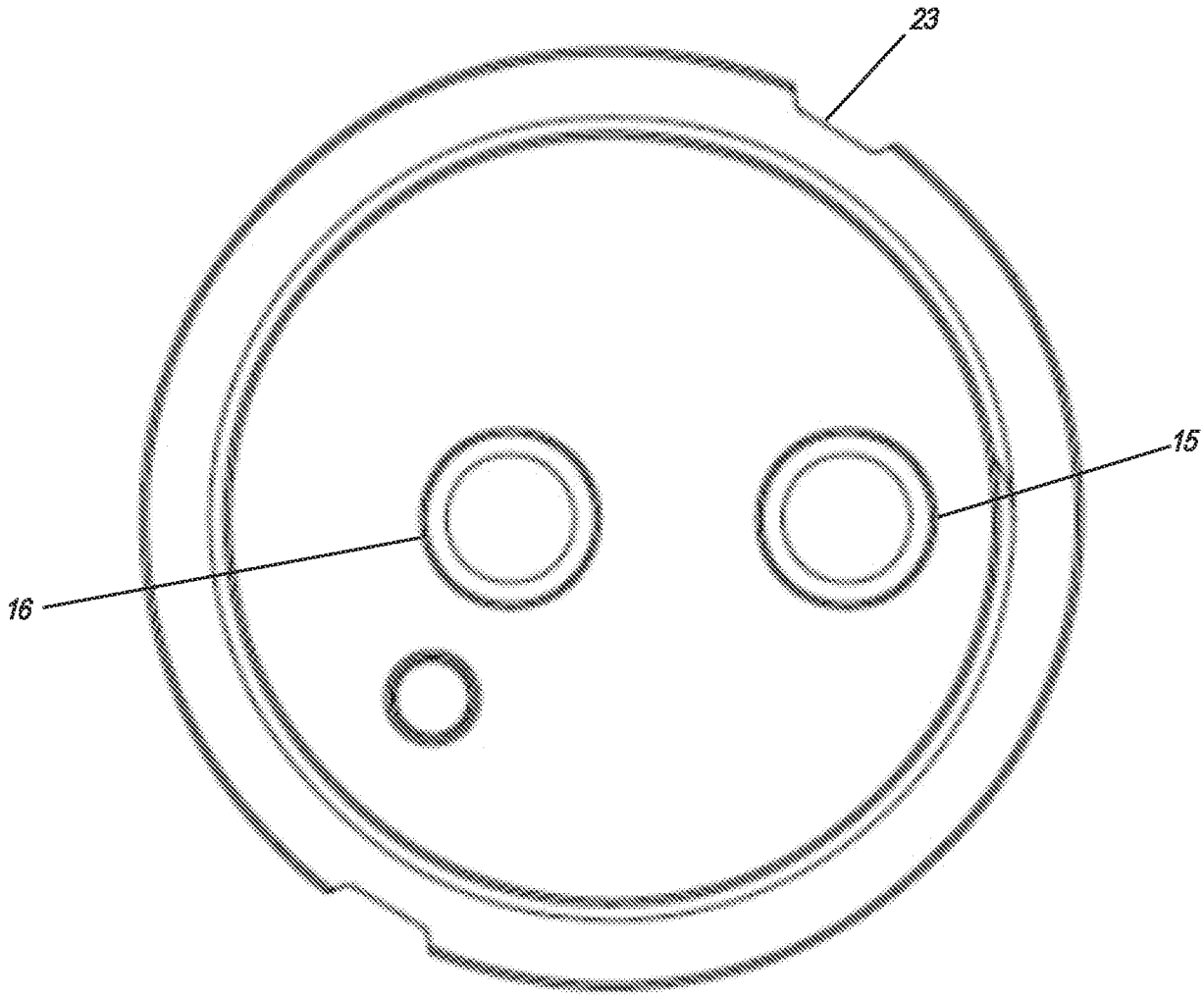


FIGURE 10B

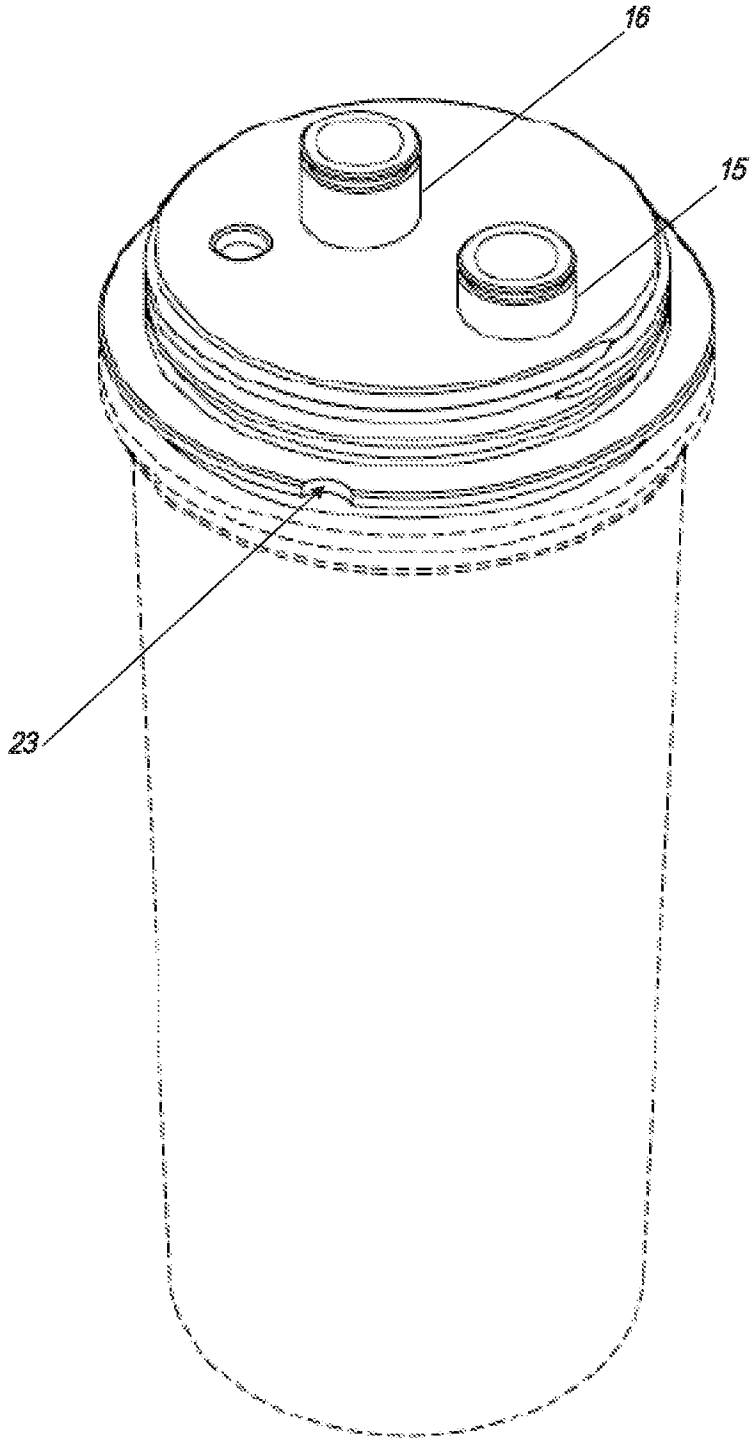


FIGURE 11A

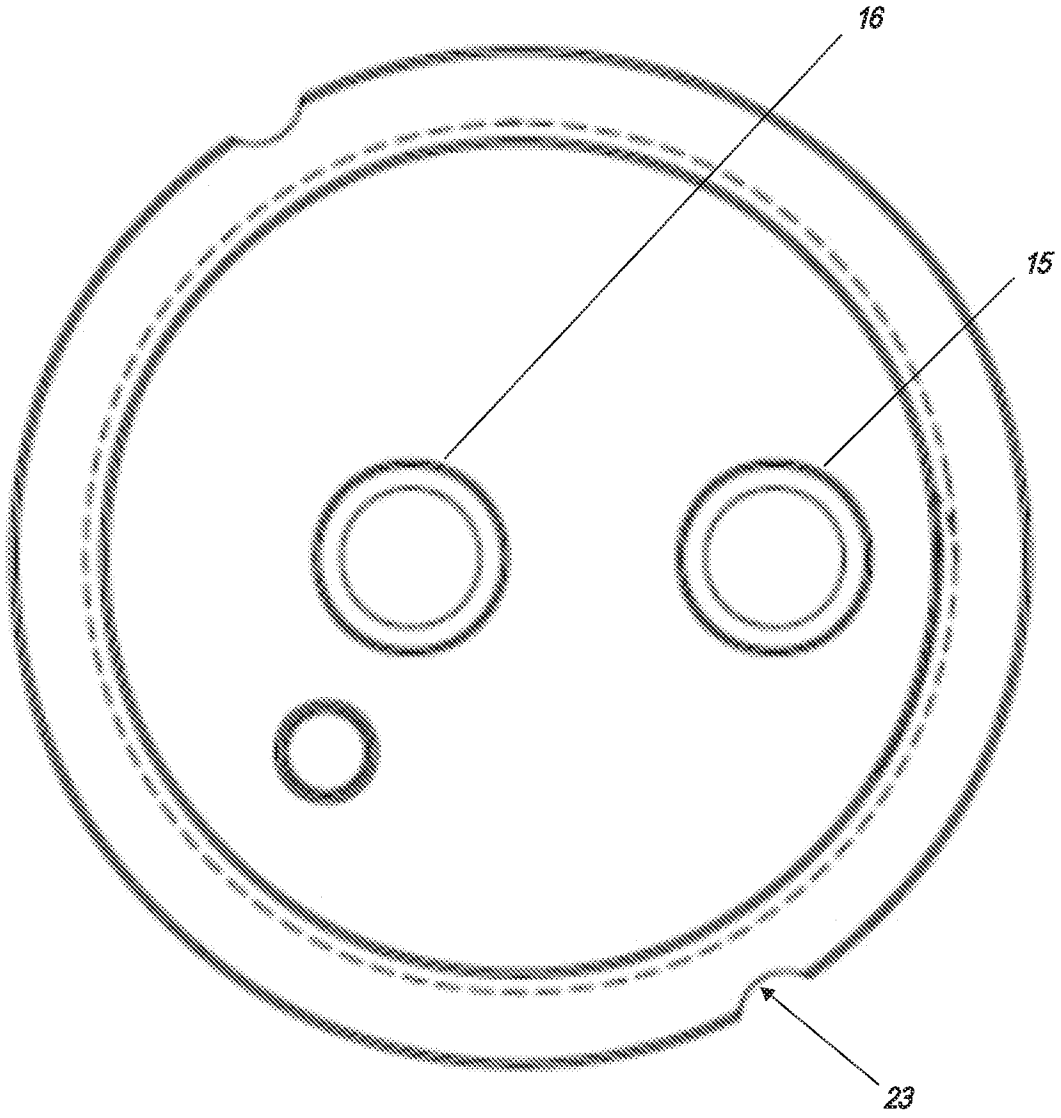


FIGURE 11B

DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

RELATED APPLICATIONS

[1] 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

[2] 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

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] 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.

[16] 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.

[17] 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.

[18] 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

[19] 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.

[20] 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:

[21] (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;

[22] (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;

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

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

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

[26] 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

[32] 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

[33] 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.

[34] 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.

[35] FIG. 3a 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.

[36] FIG. 3b 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.

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

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

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

[40] Fig. 5b 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.

[41] 1-Backplate

[42] 2-Waste Inlet (from dental practice)

[43] 3-Air/water Separator Top

[44] 4-Top Support Bracket

[45] 5-Air/Water Separation Tank

[46] 6-Suction tube

[47] 7-Air/Water Separator Base

[48] 8-0utlet Tube (to vacuum system)

[49] 9-Recycling Container Top

[50] 10-Lower Support Bracket

[51] 11-Restrictor

[52] 12-Detachable Recycling Container

[53] 13-Retaining Pins (2)

[54] 14- air-water separator tank effluent outlet port

[55] 15- recycling container inlet port

[56] 16- recycling container outlet port

[57] 17- recycling container threads

[58] 18- two tier recycling cap

[59] 19- O-ring groove

[60] 20- cap plugs

[61] 21- O-ring

[62] 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.

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

[64] 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.

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

[66] 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.

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

[68] 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.

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

[70] 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.

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

[72] 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.

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

~~[74] 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.~~

~~[75] Figure 12B is a schematic view of the same embodiment, viewing the top of the container from directly above.~~

~~[76] 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.~~

~~[77] Figure 13B is a schematic view of the same embodiment, viewing the top of the container from directly above.~~

~~[78] 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.~~

~~[79] Figure 14B is a schematic view of the same embodiment, viewing the top of the container from directly above.~~

~~[80] 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.~~

~~[81] 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

[82] 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.

[83] 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.

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

[85] 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.

[86] 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.

[87] 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.

[88] 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.

[89] 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.

[90] 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.

[91] 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.

[92] 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.

[93] 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.

[94] 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.

[95] **Figure 3** shows a schematic diagram of an adapter **25** 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.

[96] **Figure 4a** 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 **19** on the recycling container **12** above a flange structure **22** that protrudes radially away from the central axis of the container **12**. The removable retaining pins **13,** described above with respect to Figure 2, fit within the region below the flange structure **22.** 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**.

[97] ~~**Figures**~~ **Figure 6** through **Figure 11~~15~~** show several embodiments of irregular keyways **23** on a recycling container. ~~of the present invention, which include the~~ The inlet port **15** and the outlet port **16** are on the top mating surface, and the irregular keyways **23** are cast into the outer top mating surface.

[98] 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.

[99] 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.

[100] 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.

[101] 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.

[102] 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.

[103] 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.

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

DENTAL AMALGAM SEPARATION AND RECYCLING SYSTEM

RELATED APPLICATIONS

[1] 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

[2] 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

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] 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.

[16] 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.

[17] 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.

[18] 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

[19] 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.

[20] 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:

[21] (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;

[22] (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;

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

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

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

[26] 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

[32] 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

[33] 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.

[34] 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.

[35] FIG. 3a 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.

[36] FIG. 3b 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.

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

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

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

[40] Fig. 5b 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.

[41] 1-Backplate

[42] 2-Waste Inlet (from dental practice)

[43] 3-Air/water Separator Top

[44] 4-Top Support Bracket

[45] 5-Air/Water Separation Tank

[46] 6-Suction tube

[47] 7-Air/Water Separator Base

[48] 8-0utlet Tube (to vacuum system)

[49] 9-Recycling Container Top

[50] 10-Lower Support Bracket

[51] 11-Restrictor

[52] 12-Detachable Recycling Container

[53] 13-Retaining Pins (2)

[54] 14- air-water separator tank effluent outlet port

[55] 15- recycling container inlet port

[56] 16- recycling container outlet port

[57] 17- recycling container threads

[58] 18- two tier recycling cap

[59] 19- O-ring groove

[60] 20- cap plugs

[61] 21- O-ring

[62] 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.

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

[64] 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.

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

[66] 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.

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

[68] 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.

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

[70] 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.

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

[72] 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.

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

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

[74] 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.

[75] 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.

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

[77] 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.

[78] 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.

[79] 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.

[80] 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.

[81] 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.

[82] 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.

[83] 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.

[84] 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.

[85] 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.

[86] 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.

[87] **Figure 3** shows a schematic diagram of an adapter **25** 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.

[88] **Figure 4a** 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 **19** on the recycling container **12** above a flange structure **22** that protrudes radially away from the central axis of the container **12**. The removable retaining pins **13,** described above with respect to Figure 2, fit within the region below the flange structure **22.** 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**.

[89] **Figure 6** through **Figure 11** show several embodiments of irregular keyways **23** on a recycling container. The inlet port **15** and the outlet port **16** are on the top mating surface, and the irregular keyways **23** are cast into the outer top mating surface.

[90] 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.

[91] 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.

[92] 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.

[93] 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.

[94] 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.

[95] 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.

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

Electronic Patent Application Fee Transmittal

Application Number:	17965556
Filing Date:	13-Oct-2022
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-T2

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:				
CLAIMS IN EXCESS OF 20	2202	3	40	120
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**120**

Electronic Acknowledgement Receipt

EFS ID:	47497167
Application Number:	17965556
International Application Number:	
Confirmation Number:	8686
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-T2
Receipt Date:	07-FEB-2023
Filing Date:	13-OCT-2022
Time Stamp:	21:15:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$120
RAM confirmation Number	E202327L17041459
Deposit Account	
Authorized User	

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SMTX-T2-Response_To_OA_Dated_Jan_20_2023.pdf	162249 390d11fa62253bf88fffdb03bbd4560494ab958d	yes	15

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Request for Reconsideration-After Non-Final Rejection	1	5
Claims	6	12
Applicant Arguments/Remarks Made in an Amendment	13	15

Warnings:					
Information:					
2	Drawings-only black and white line drawings	SMTX-T2-Drawings_Replacement_Sheets.pdf	752682 d69c1188d972c00e5942507f1901412d1e10d6c0	no	18
Warnings:					
Information:					
3	Specification	SMTX-T2-17965556-MARKED-UP-SPECIFICATION.pdf	115416 bb2168e61be97b56e082a6a331cdc4c585830e7b	no	13
Warnings:					
Information:					
4	Specification	SMTX-T2-17965556-CLEAN-SPECIFICATION.pdf	112016 05c72a8c4b11079f60e68f0c14134ea28e3fe208	no	13
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	37612 31da48d4cc77f980b472eed987eb160ec5b4511a	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1179975

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.

AMENDMENT TO SPECIFICATION:

Please amend the specification as follows. A Marked-Up version of the specification and a Clean version of the specification are attached that take into account the amendments below:

- Please delete paragraphs [0074] to [0081] to take into account the deletions of the figures noted below.

- Please amend paragraph [0095] to add reference numeral "25" after the word "adapter", as follows:

  --[0095] Figure 3 shows a schematic diagram of an adapter 25 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.--

- Please amend paragraph [0096] to describe the flange structure "22" in a manner consistent with what is illustrated in the figures, as follows:

  --[0096] Figure 4a 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 19 on the recycling container 12 that is located above a flange structure 22 that protrudes radially away from the central axis of the container 12. The removable retaining pins 13, described above with respect to Figure 2, fit within the region below the flange structure 22. 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.

- Please amend paragraph [0097] to remove reference to the deleted figures and add reference numerals "15", "16" and "23" for the inlet port, outlet port, and keyways, as follow:

  --[0097] ~~Figures~~ Figure 6 through Figure 11~~15~~ show several embodiments of irregular keyways 23 on a recycling container. ~~of the present invention, which include the~~ The inlet port 15 and the outlet port 16 are on the top mating surface, and the irregular keyways 23 are cast into the outer top mating surface.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	17/965,556
Confirmation No.	:	*8686*
Inventor	:	*Nicholas Mozzicato*
Applicant	:	*Solmetex LLC*
Filed	:	*October 13, 2022*
Title	:	*Detachable Recycling Container*
TC/A.U.	:	*3773*
Examiner	:	*Nicholas D. Lucchesi*
Docket No.	:	*SMTX-001-T2*

Commissioner for Patents – via EFS
P.O. Box 1450
Alexandria, Virginia 22313-1450

RESPONSE TO NON-FINAL OFFICE ACTION DATED JANUARY 20, 2023

Dear Commissioner:

The Applicant respectfully requests that this Response to the Non-Final Office Action be entered into the record of the above-captioned patent application.

The Applicant's **Amendments to the Specification** are presented on page 2 of this paper.

The Applicant's **Amendments to the Drawings** are presented on page 3 of this paper.

The Applicant's **Listing of Claims** is presented on page 6 of this paper.

The Applicant's **Remarks** begin on page 13 of this paper.

AMENDMENT TO DRAWINGS:

Please make the following amendments to the drawings. The Applicant has submitted a clean Replacement Drawing Set that takes into account these changes:

- In FIGURE 2, please change the reference line for the pin 13 from an arrowed lead line to a straight lead line that touches the pin 13.

- In FIGURES 3A and 3B, please add reference numeral "25" to identify the adapter 25.

- In FIGURE 4A, please add reference numerals "15", "16", and "22" to identify the container inlet port 15, container outlet port 16, and the flange structure 22, respectively.

- In FIGURE 4B, please add reference numerals "12", "15", "16", "18", "19", "20", "21" and "22" to identify the container 12, the container inlet port 15, the container outlet port 16, the cap 18, the O-ring groove 19, the plugs 20, the O-ring 21, and the flange structure 22, respectively.

- In FIGURE 5A, please change reference numeral "17" to reference numeral "18" to properly identify the cap 18.

- Please delete FIGURES 6A, 6B, 7A, 7B, 8A, 8B, 9A, and 9B.

- In FIGURE 10A, please change the figure number to FIGURE 6A (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 10B, please change the figure number to FIGURE 6B (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 11A, please change the figure number to FIGURE 7A (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 11B, please change the figure number to FIGURE 7B (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 12A, please change the figure number to FIGURE 8A (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 12B, please change the figure number to FIGURE 8B (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 13A, please change the figure number to FIGURE 9A (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 13B, please change the figure number to FIGURE 9B (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 14A, please change the figure number to FIGURE 10A (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 14B, please change the figure number to FIGURE 10B (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 15A, please change the figure number to FIGURE 11A (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

- In FIGURE 15B, please change the figure number to FIGURE 11B (due to former FIGS. 6-9 being deleted) and add reference numerals "15", "16", and "23" to identify the container inlet port 15, the container outlet port 16, and one of the keyways 23, respectively.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/965,556	Filing Date 10/13/2022	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	02/06/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 20	= 3		x $40 =	120
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $192 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	120

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/MONICA D FRANCIS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

80709 7590 01/20/2023

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

EXAMINER	
LUCCHESI, NICHOLAS D	

ART UNIT	PAPER NUMBER
3772	

NOTIFICATION DATE	DELIVERY MODE
01/20/2023	ELECTRONIC

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

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

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

srlpatents@aol.com

Office Action Summary	Application No. 17/965,556	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 --

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 10/13/22.

☐ 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) 13-32 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) 13-32 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 10/13/22 is/are: a)☐ accepted or b)☑ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

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 are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "pins" (reference numeral 13) "radially protruding structures" and the "pair of pin engaging surfaces" (claims 13,25,31) the "flange" (claims 20,21,28,29), and the "keying feature" (claims 23,24,30) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

It is also noted that figures 3A, 3B, 4A, 5B, 6A, 6B, 7A, 7B, 8A, 8B, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B, 13A, 13B, 14A, 14B, 15A, 15B do not contain any reference numerals that refer to elements in these figures that are described in the specification. Correction is required.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by

the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 13-32 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification fails to sufficiently disclose and describe the "radially protruding structures"and the "pair of pin engaging surfaces" (claims 13,25,31), the "flange" (claims 20,21,28,29), and the "keying feature" (claims 23,24,30). It is also noted that, while disclosed in the specification, the "pins" 13 are not sufficiently disclosed.

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 13-32 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 applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

In claims 13,25,31, line 1, "dental-amalgam" should be inserted after "detachable" so that the preamble agrees with that of the dependent claims.

In claim 13, lines 19-20, "the pair of pin-engaging surfaces" has no prior antecedent basis.

Allowable Subject Matter

Claims 13-32 would be allowable if rewritten or amended 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.

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 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, Jacqueline Johanas can be reached on 571-270-5085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NICHOLAS D LUCCHESI/
Primary Examiner, Art Unit 3772

Notice of References Cited	Application/Control No. 17/965,556	Applicant(s)/Patent Under Reexamination Mozzicato et al.	
	Examiner NICHOLAS D LUCCHESI	Art Unit 3772	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20130199975-A1	08-2013	Stone; Mark E.	A61C17/065	210/136
*	B	US-20060093990-A1	05-2006	Stone; Mark E.	A61C17/06	433/92
*	C	US-20050282107-A1	12-2005	Stone, Mark E.	A61C17/065	433/92
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/965,556	Mozzicato et al.
	Examiner	Art Unit
	NICHOLAS D LUCCHESI	3772

CPC - Searched*		
Symbol	Date	Examiner
A61C 17/065; A61M 1/64; B01D 21/2444; B65D 43/0231, 2543/00092	01/13/2023	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
Assignee Search; Inventor Search	01/13/2023	NL

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

/NICHOLAS D LUCCHESI/ Primary Examiner, Art Unit 3772	

PGR2023-00055 Ex. 1002
Page 162 of 346

List of References **FIRST INFORMATION DISCLOSURE STATEMENT** Page 1 of 5	Atty. Docket No. SMTX-001-T2	Application No.: Cont. of 16/941,522
	Applicant(s): Solmetex LLC	
	Filing Date: July 28, 2020	Art Unit: Central, Docket

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A1	54,414 A	05/01/1866	Sangster
	A2	D024,111	03/12/1895	Landgraf
	A3	1,032,879 A	07/16/1912	Carlton
	A4	2,467,547 A	04/19/1949	Birnbaum
	A5	D189,743 S	02/14/1961	Happe
	A6	3,665,682 A	05/30/1972	Ciavattoni
	A7	3,870,486 A	03/11/1975	Eriksson
	A8	3,988,134 A	10/26/1976	Gandrud
	A9	4,083,705 A	04/11/1978	Parise
	A10	4,097,381 A	06/27/1978	Ritzler
	A11	4,226,054 A	10/07/1980	Coty
	A12	4,326,952 A	04/27/1982	Blake
	A13	4,385,891 A	05/31/1983	Ligotti
	A14	4,599,170 A	07/08/1986	Friedman
	A15	D286,268 S	10/21/1986	Wolff
	A16	D288,528 S	03/03/1987	Parad
	A17	D288,529 S	03/03/1987	Parad
	A18	4,753,632 A	06/28/1988	Hofmann
	A19	4,761,235 A	08/02/1988	Haentjens
	A20	D306,266 S	02/27/1990	Hargrove
	A21	D306,649 S	03/13/1990	Lapicola
	A22	4,911,315 A	03/27/1990	Shrum
	A23	4,934,545 A	06/19/1990	Pezzoli
	A24	4,951,845 A	08/28/1990	Pezzoli
	A25	4,957,621 A	09/18/1990	Rohloff
	A26	5,018,971 A	05/28/1991	Trawoeger
	A27	5,114,578 A	05/19/1992	Sundstrom
	A28	5,125,522 A	06/30/1992	Pezzoli

EXAMINER: /NICHOLAS D LUCCHESI/	**DATE CONSIDERED:** 01/13/2023

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

List of References **FIRST INFORMATION DISCLOSURE STATEMENT** Page 2 of 5	Atty. Docket No. SMTX-001-T2	Application No.: Cont. of 16/941,522
	Applicant(s): Solmetex LLC	
	Filing Date: July 28, 2020	Art Unit: Central, Docket

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A29	D341,085 S	11/09/1993	Charbonneau
	A30	5,330,641 A	07/19/1994	Cattani
	A31	D349,647 A	08/16/1994	Moffitt
	A32	5,343,592 A	09/06/1994	Parise
	A33	5,421,996 A	06/06/1995	Trawoeger
	A34	D359,236 S	06/13/1995	Spafford
	A35	5,484,282 A	01/16/1996	Trawoger
	A36	5,509,551 A	04/23/1996	Terrell, II
	A37	D372,426 S	08/06/1996	Garnett
	A38	D374,481 S	10/08/1996	McCallister
	A39	5,613,851 A	03/25/1997	Trawoeger
	A40	D384,280 S	09/30/1997	Kuczer
	A41	5,730,322 A	03/24/1998	Iba
	A42	5,741,134 A	04/21/1998	Davis
	A43	5,743,735 A	04/28/1998	Vollstedt
	A44	5,795,159 A	08/18/1998	Ralls
	A45	5,797,742 A	08/25/1998	Fraker
	A46	5,873,494 A	02/23/1999	Dallas, Jr.
	A47	5,958,113 A	09/28/1999	Collins
	A48	D423,354 S	04/25/2000	Lin
	A49	6,083,307 A	07/04/2000	Dular
	A50	D428,768 S	08/01/2000	Betras
	A51	D431,158 S	09/26/2000	Schwab
	A52	D433,275 S	11/07/2000	Betras
	A53	6,149,812 A	11/21/2000	Erickson
	A54	D435,194 S	12/19/2000	Betras
	A55	6,409,803 B1	06/25/2002	Tremel
	A56	6,521,131 B1	02/18/2003	Hamilton

EXAMINER: /NICHOLAS D LUCCHESI/	**DATE CONSIDERED:** 01/13/2023

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

List of References **FIRST INFORMATION DISCLOSURE STATEMENT** Page 3 of 5	Atty. Docket No. SMTX-001-T2	Application No.: Cont. of 16/941,522
	Applicant(s): Solmetex LLC	
	Filing Date: July 28, 2020	Art Unit: Central, Docket

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A57	6,592,754 B2	07/15/2003	Chilibeck
	A58	6,592,769 B2	07/15/2003	Erickson
	A59	6,638,066 B2	10/28/2003	Hubner
	A60	6,660,160 B1	12/09/2003	Ernryd
	A61	6,692,636 B2	02/17/2004	Chilibeck
	A62	6,790,038 B2	09/14/2004	Hubner
	A63	6,797,178 B2	09/28/2004	Albiston
	A64	D503,097 S	03/22/2005	Burr
	A65	D503,110 S	03/22/2005	Burr
	A66	6,946,069 B2	09/20/2005	Chilibeck
	A67	D522,359 S	06/06/2006	Van Diepen
	A68	7,063,793 B2	06/20/2006	Albiston
	A69	7,080,425 B2	07/25/2006	Smith
	A70	7,131,839 B2	11/07/2006	March
	A71	7,156,214 B2	01/02/2007	Pradel
	A72	7,166,214 B2	01/23/2007	Armstrong
	A73	D536,247 S	02/06/2007	Burr
	A74	7,182,599 B2	02/27/2007	Stone
	A75	7,306,460 B2	12/11/2007	Hubner
	A76	D574,237 S	08/05/2008	Yates, III
	A77	7,422,615 B2	09/09/2008	Kim
	A78	7,604,674 B2	10/20/2009	Han
	A79	7,753,976 B2	07/13/2010	Hyun
	A80	7,767,079 B2	08/03/2010	Darcy
	A81	D630,094 S	01/04/2011	Maxwell
	A82	8,393,898 B2	03/12/2013	McCary
	A83	8,636,837 B2	01/28/2014	Nonnenmacher
	A84	8,692,636 B2	02/17/2004	Chilbeck

EXAMINER: /NICHOLAS D LUCCHESI/	**DATE CONSIDERED:** 01/13/2023

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

List of References **FIRST INFORMATION DISCLOSURE STATEMENT** Page 4 of 5	Atty. Docket No. SMTX-001-T2	Application No.: Cont. of 16/941,522
	Applicant(s): Solmetex LLC	
	Filing Date: July 28, 2020	Art Unit: Central, Docket

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A85	D705,059 S	05/20/2014	Hutchinson
	A86	D706,135 S	06/03/2014	Hutchinson
	A87	D727,149 S	04/21/2015	Humm
	A88	D750,962 S	03/08/2016	Liu
	A89	9,332,969 B2	05/10/2016	Han
	A90	D835,264 S	12/04/2018	Mozzicato
	A91	D835,778 S	12/11/2018	Mozzicato
	A92	D835,779 S	12/11/2018	Mozzicato
	A93	D840,533 S	02/12/2019	Mozzicato
	A94	D840,534 S	02/12/2019	Mozzicato
	A95	D848,612 S	05/14/2019	Mozzicato
	A96	10,342,647 B2	07/09/2019	Stolarik
	A97	10,646,313 B2	05/12/2020	Mozzicato
	A98	10,779,923 B2	09/22/2020	Mozzicato
	A99	11,278,382 B2	03/22/2022	Stolarik

U.S. PATENT APPLICATION PUBLICATIONS				
Examiner Initial	**Cite No.**	**Patent Application Publication Number**	**Publication Date**	**First Named Inventor**
	B1	2001/0047956 A1	12/06/2001	Albiston
	B2	2002/0185186 A1	12/12/2002	Juliar
	B3	2003/0003417 A1	01/02/2003	Hubner
	B4	2004/0259052 A1	12/23/2004	Hubner
	B5	2005/0016913 A1	01/27/2005	Giesel
	B6	2006/0065594 A1	03/30/2006	Armstrong
	B7	2010/0264074 A1	10/21/2010	Darcy
	B8	2014/0154641 A1	06/05/2014	Bogen
	B9	2015/0320638 A1	11/12/2015	Becker
	B10	2018/0098831 A1	04/12/2018	Mozzicato

EXAMINER: /NICHOLAS D LUCCHESI/	**DATE CONSIDERED:** 01/13/2023

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

List of References **FIRST INFORMATION DISCLOSURE STATEMENT** Page 5 of 5	Atty. Docket No. SMTX-001-T2	Application No.: Cont. of 16/941,522
	Applicant(s): Solmetex LLC	
	Filing Date: July 28, 2020	Art Unit: Central, Docket

U.S. PATENT APPLICATION PUBLICATIONS				
Examiner Initial	**Cite No.**	**Patent Application Publication Number**	**Publication Date**	**First Named Inventor**
	B11	2022/0211476 A1	07/07/2022	Stolarik

FOREIGN PATENT DOCUMENTS					
Examiner Initial	**Cite No.**	**Foreign Document Number**	**Publication Date**	**Country**	**Translation**
	C1	CA 2442513 A1	03/23/2005	CA	N/A
	C2	EP 1366728 A1	12/03/2003	EP	N/A
	C3	WO 1983/002720 A1	08/18/1983	PCT	N/A
	C4	WO 1994/016643 A1	08/04/1994	PCT	English abstract only
	C5	WO 2018/006106 A1	01/11/2018	PCT	N/A

OTHER DOCUMENTS (including publisher, author (if any), title, relevant pages, date, and place of publication)		
Examiner Initial	**Cite No.**	**Document Information**
	D1	"International Standard ISO 11143: Dentistry – Amalgam separators"; Second edition; ISO Copyright Office, Switzerland; 2008/07/01; (32 pages)
	D2	Solmetex; "Solmetex Hg5 Amalgam Separator, Type 2 – Maximum Flow = 1000 ml/min: Installation and Maintenance Instructions"; Northborough, Massachusetts; Revised April 27, 2012 (8 pages)
	D3	ASME USAS B17-1; "Keys and Keys Seals": American Society of Mechanical Engineers; USA Standard, 1967 (Reaffirmed 2013)

EXAMINER: /NICHOLAS D LUCCHESI/	**DATE CONSIDERED:** 01/13/2023

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	11	((("Solmetex") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/01/13 11:10 PM
L2	20	((("MOZZICATO") near3 ("Nicholas")) OR (("GOULSTON") near3 ("Richard")) OR (("SCHOFIELD") near3 ("Robin")) OR (("TOOLE") near3 ("Michael"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/01/13 11:22 PM
L3	209	A61C17/065.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:23 PM
L4	153	A61M1/64.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L5	1014	B01D21/2444.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L6	0	B01D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L7	669	B65D43/0231.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:24 PM
L8	4544	B65D2543/00092.cpc.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:25 PM
L9	6164	L3 OR L4 OR L5 OR L7 OR L8	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:25 PM
L10	73	L9 AND dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:26 PM
L11	226	dental AND amalgam AND separator	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:31 PM
L12	39	L11 AND pin	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:32 PM
L13	45	L11 AND flange	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2023/01/13 11:32 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2	8686

80709 7590 12/08/2022

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

EXAMINER	
CENTRAL, DOCKET	

ART UNIT	PAPER NUMBER
OPAP	

NOTIFICATION DATE	DELIVERY MODE
12/08/2022	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

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 17/965,556	**Applicant(s)** Mozzicato et al.	
	Examiner FIKIRTE A GEREMEW	**Art Unit** OMBL	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 13 October 2022 IS **GRANTED** .

   The above-identified application has met the requirements for prioritized examination
   - A. ☑ for an original nonprovisional application (Track I).
   - B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:
   - A. filing a **petition for extension of time** to extend the time period for filing a reply;
   - B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;
   - C. filing a **request for continued examination** ;
   - D. filing a notice of appeal;
   - E. filing a request for suspension of action;
   - F. mailing of a notice of allowance;
   - G. mailing of a final Office action;
   - H. completion of examination as defined in 37 CFR 41.102; or
   - I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT ASSISTANT, OMBL	

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
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2

CONFIRMATION NO. 8686

NEW OR REVISED PPD NOTICE

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

OC00000136754676

NOTICE OF NEW OR REVISED PROJECTED PUBLICATION DATE

The above-identified application has a new or revised projected publication date. The current projected publication date for this application is 02/09/2023. If this is a new projected publication date (there was no previous projected publication date), the application has been cleared by Licensing & Review or a secrecy order has been rescinded and the application is now in the publication queue.

If this is a revised projected publication date (one that is different from a previously communicated projected publication date), the publication date has been revised due to processing delays in the USPTO or the abandonment and subsequent revival of an application. The application is anticipated to be published on a date that is more than six weeks different from the originally-projected publication date.

More detailed publication information is available through the private side of Patent Application Information Retrieval (PAIR) System. The direct link to access PAIR is currently http://pair.uspto.gov. Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Questions relating to this Notice 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.

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
17/965,556	10/13/2022		910	SMTX-001-T2	19	3

CONFIRMATION NO. 8686

UPDATED FILING RECEIPT

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

OC00000050339958

Date Mailed: 11/02/2022

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

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

Applicant(s)

Solmetex LLC, Northborough, MA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/941,522 07/28/2020
which is a CIP of 16/033,823 07/12/2018 PAT 10,779,923
which is a CIP of 15/730,828 10/12/2017 PAT 10,646,313
which claims benefit of 62/414,712 10/29/2016
and claims benefit of 62/406,990 10/12/2016
and is a CON of 29/585,674 11/28/2016 PAT D840534
and is a CON of 29/585,668 11/28/2016 PAT D835779
and is a CON of 29/585,659 11/28/2016 PAT D835778
and is a CON of 29/577,701 09/14/2016 PAT D848612
and is a CON of 29/567,544 06/09/2016 PAT D840533
and is a CON of 29/565,622 05/23/2016 PAT D835264

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.

If Required, Foreign Filing License Granted: 10/26/2022

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/965,556**

Projected Publication Date: 02/09/2023

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

Detachable Recycling Container

Preliminary Class

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

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.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/965,556

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	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	19 minus 20 =	* 0	x =	0	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x =	0			
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			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	830		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	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: TBA
MOZZICATTO	)	
	:	Group Art Unit TBA
Application No.: 17/965,556	)	
	:	Confirmation No. 8686
Filed: October 13, 2022	)	
	:	
For: Detachable Recycling Container	)	
	:	

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, 2022, Applicant responds as follows:

1. Executed Declaration of Nicholas Mozzicato.
2. Applicant submits herewith the small entity surcharge in the amount of $80.00 under 37 C.F.R. §1.16(f).
3. Applicant claims small entity status under 37 C.F.R. §1.27.
4. Remarks begin on page 2.

REMARKS

Applicant submits this response to the Notice to File Missing Parts, which was mailed on October 27, 2022

Applicant submits herewith the executed declaration of co-inventor Nicholas Mozzicato. With this submission, and payment of the appropriate small entity surcharge of $80.00, it is believed that all requirements for Prioritized Examination of this application under § 1.102(e)(1) 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
October 31 2022

PGR2023-00055 - Ex. 1002
Page 178 of 346

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. 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 Container

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 17/965,556 filed on October 13, 2022.

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): 10-28-22

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.

Electronic Patent Application Fee Transmittal

Application Number:	17965556
Filing Date:	13-Oct-2022
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-T2

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:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**80**

Electronic Acknowledgement Receipt

EFS ID:	46924135
Application Number:	17965556
International Application Number:	
Confirmation Number:	8686
Title of Invention:	Detachable Recycling Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-T2
Receipt Date:	31-OCT-2022
Filing Date:	13-OCT-2022
Time Stamp:	11:37:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$80
RAM confirmation Number	E20220UB38194719
Deposit Account	
Authorized User	

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	Solmetex-001-T2-Response_to_10-27-2022-NTFMP.pdf	59651 ac6afe62c15412494aa69bcd77d23167f4dc5b73	no	2
Warnings:					
Information:					
2	Oath or Declaration filed	Mozzicato-dec.pdf	1737528 2f335d0761d20d3cfea140afecd350a63d3757ce	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	37890 28f4550b770f4f4090a704adeff12fe225a40d80	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1835069		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/965,556	10/13/2022	Nicholas Mozzicato	SMTX-001-T2

CONFIRMATION NO. 8686

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

FORMALITIES LETTER

OC000000050156705

Date Mailed: 10/27/2022

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

An application number and filing date have been accorded to the above-identified nonprovisional 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).

- Surcharge as set forth in 37 CFR 1.16(f) has not been received.

  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 (including the fees noted above) are as follows. 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.)

- $**80** surcharge.
- $(**0**) previous unapplied payment amount.
- $**80** TOTAL FEE BALANCE DUE.

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).

Items Required To Avoid Processing Delays:

The deficiencies indicated below should be addressed promptly to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s) *as named on the application data sheet (ADS)*:

  Nicholas Mozzicato

  An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor must be submitted no later than the date on which the issue fee is paid in response to a notice requiring such fee. See 37 CFR 1.53(f).

  Applicant is advised to review the inventorship provided on the ADS and reflected on the filing receipt to ensure each inventor's name is provided accurately.

  If correction is needed to the name of any inventor provided on the ADS, applicant must submit a properly signed request to correct the inventor name according to 37 CFR 1.48(f), along with the appropriate fee under 37 CFR 1.17(i) and a corrected ADS in compliance with 37 CFR 1.76(c), i.e. identifying the information that is being changed with underlining for insertions, and strike-through or brackets for text removed.

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 addressed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

REPLY VIA ELECTRONIC FILING

A reply may be submitted via electronic filing only by registered users of the appropriate USPTO patent electronic filing system and must include:

- A separate document having the document description, "**Applicant response to Pre-Exam Formalities Notice**"; and
- the item(s) for which a reply period is set forth above.

For more information about electronic filing, contact the Patent Electronic Business Center (EBC) 1-866-217-9197 or visit https://www.uspto.gov/ebc

NOTE: If the reply is not being submitted electronically, a copy of this notice must be included.

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**.

/qtran/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/965,556

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	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	19 minus 20 =	* 0	x =	0	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x =	0			
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			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	830		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	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/965,556	10/13/2022		830	SMTX-001-T2	19	3

CONFIRMATION NO. 8686

FILING RECEIPT

80709
Steven R. Lazar
SRL Patents
234 Broadway
Arlington, MA 02474

OC00000050156703

Date Mailed: 10/27/2022

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

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

Applicant(s)

Solmetex LLC, Northborough, MA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/941,522 07/28/2020
which is a CIP of 16/033,823 07/12/2018 PAT 10,779,923
which is a CIP of 15/730,828 10/12/2017 PAT 10,646,313
which claims benefit of 62/414,712 10/29/2016
and claims benefit of 62/406,990 10/12/2016
and is a CON of 29/585,674 11/28/2016 PAT D840534
and is a CON of 29/585,668 11/28/2016 PAT D835779
and is a CON of 29/585,659 11/28/2016 PAT D835778
and is a CON of 29/577,701 09/14/2016 PAT D848612
and is a CON of 29/567,544 06/09/2016 PAT D840533
and is a CON of 29/565,622 05/23/2016 PAT D835264

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.

If Required, Foreign Filing License Granted: 10/26/2022

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/965,556**

Projected Publication Date: Supplemental Fees Missing

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

Detachable Recycling Container

Preliminary Class

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

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.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Mozzicatto	Nonprovisional Application Number (if known):	TBA
Title of Invention:	Detachable Container		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Steven R. Lazar/	Date 10/13/2022
Name (Print/Typed) Steven R. Lazar	Practitioner Registration Number 32618

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☐ *Total of _____ forms are submitted.

Privacy Act Statement

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

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

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

PTO/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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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
Acton	MA	US

Mailing Address of Inventor:

Address 1	19 Preston Way
Address 2	
City	Acton
State/Province	MA
Postal Code	01720
Country	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
Stuart	FL	US

Mailing Address of Inventor:

Address 1	1928 NW Palmetto Terrace
Address 2	
City	Stuart
State/Province	FL
Postal Code	34994
Country	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

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

City	Lancaster	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	164 Old Country Road		
Address 2			
City	Lancaster	State/Province	MA
Postal Code	01523	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	Norton	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	104 Newcomb Streed, D		
Address 2			
City	Norton	State/Province	MA
Postal Code	02766	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	Detachable Recycling Container		
Attorney Docket Number	SMTX-001-T2	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	26	Suggested Figure for Publication (if any)	6A

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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)
	Continuation of	16941522	2020-07-28

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16941522	Continuation in part of	16033823	2018-07-12	10779923	2020-09-22
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16033823	Continuation in part of	15730828	2017-10-12	10646313	2020-05-12
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
15730828	Claims benefit of provisional	62414712	2016-10-29		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
15730828	Claims benefit of provisional	62406990	2016-10-12		
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15730828	Continuation of	29585674	2016-11-28	D840534	2019-02-12
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15730828	Continuation of	29585668	2016-11-28	D835779	2018-12-11
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15730828	Continuation of	29585659	2016-11-28	D835778	2018-12-11
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15730828	Continuation of	29577701	2016-09-14	D848612	2019-05-14
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15730828	Continuation of	29567544	2016-06-09	D840533	2019-02-12
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15730828	Continuation of	29565622	2016-05-23	D835264	2018-12-04

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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	50 Bearfoot Road		
Address 2			
City	Northborough	**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.

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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)	2022-10-13
First Name	Steven	Last Name	Lazar	Registration Number	32618

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

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-T2
	Application Number	
Title of Invention	Detachable Recycling Container	

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.

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.

[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.

[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

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.

[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.

[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

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-Outlet 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.

[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.

[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.

[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 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**.

[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.

[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.

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.

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.

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.

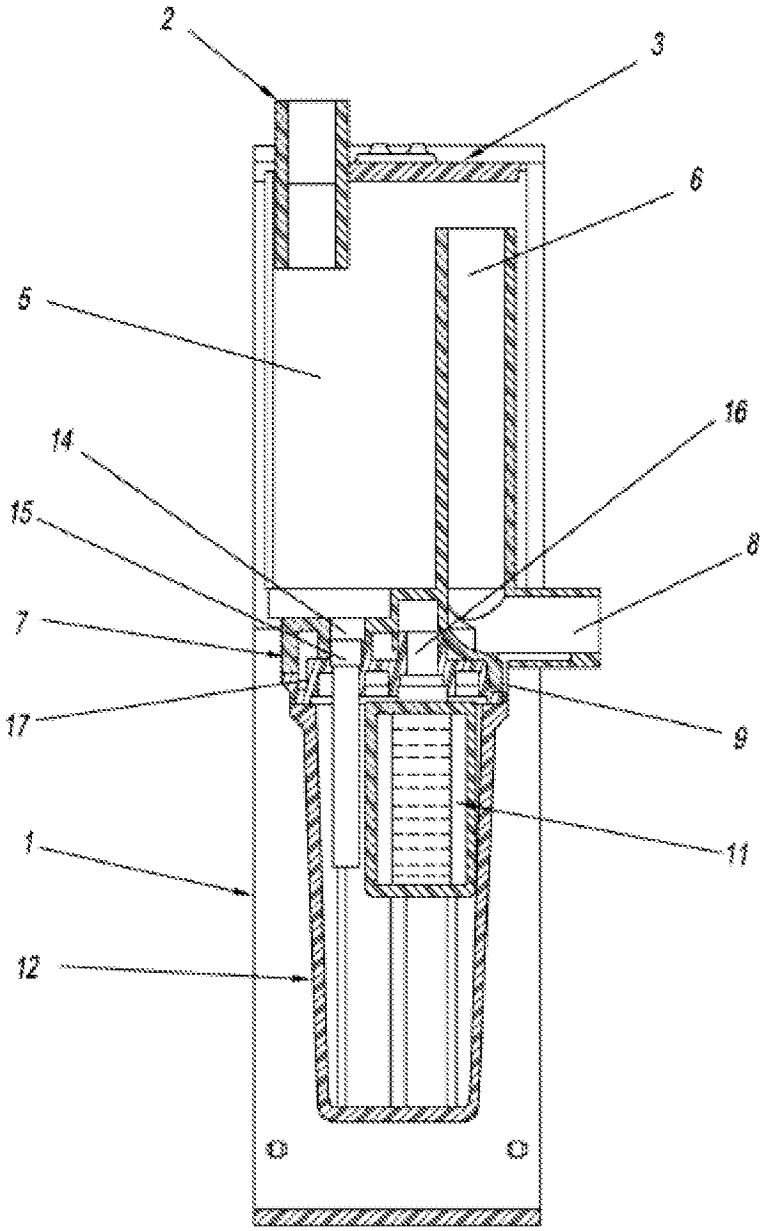


FIG. 1

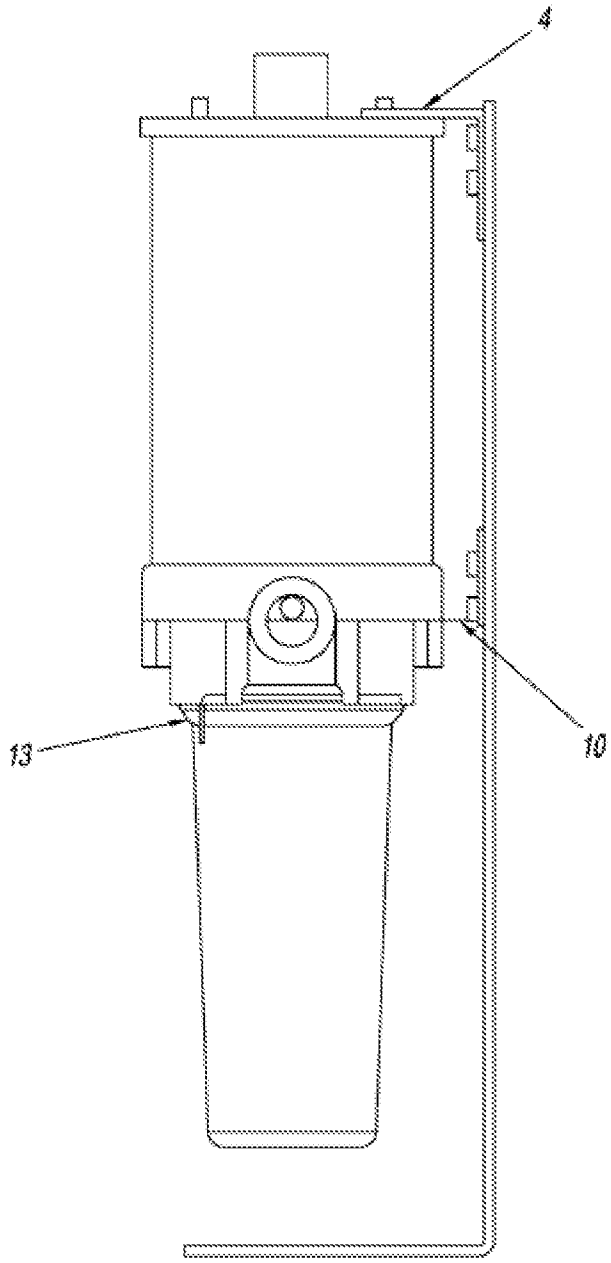


FIG. 2

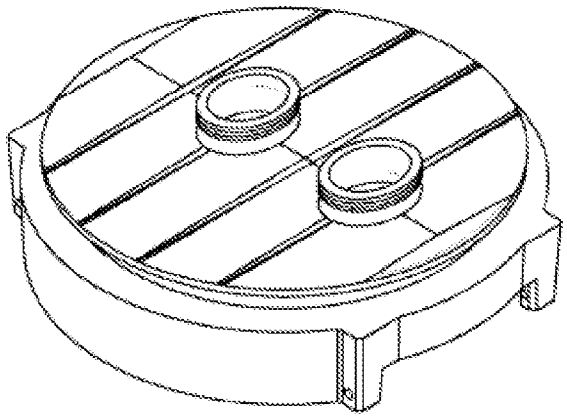


FIG. 3A

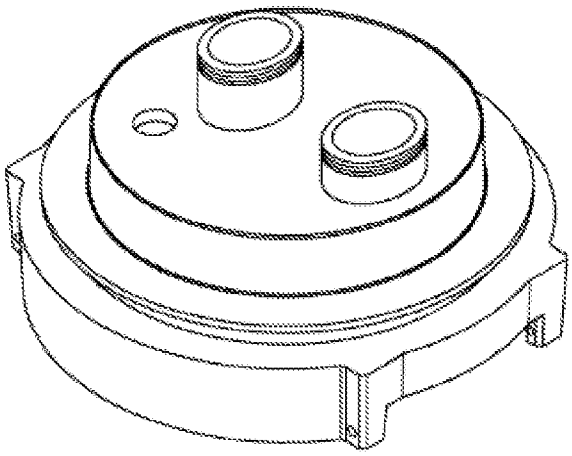


FIG. 3B

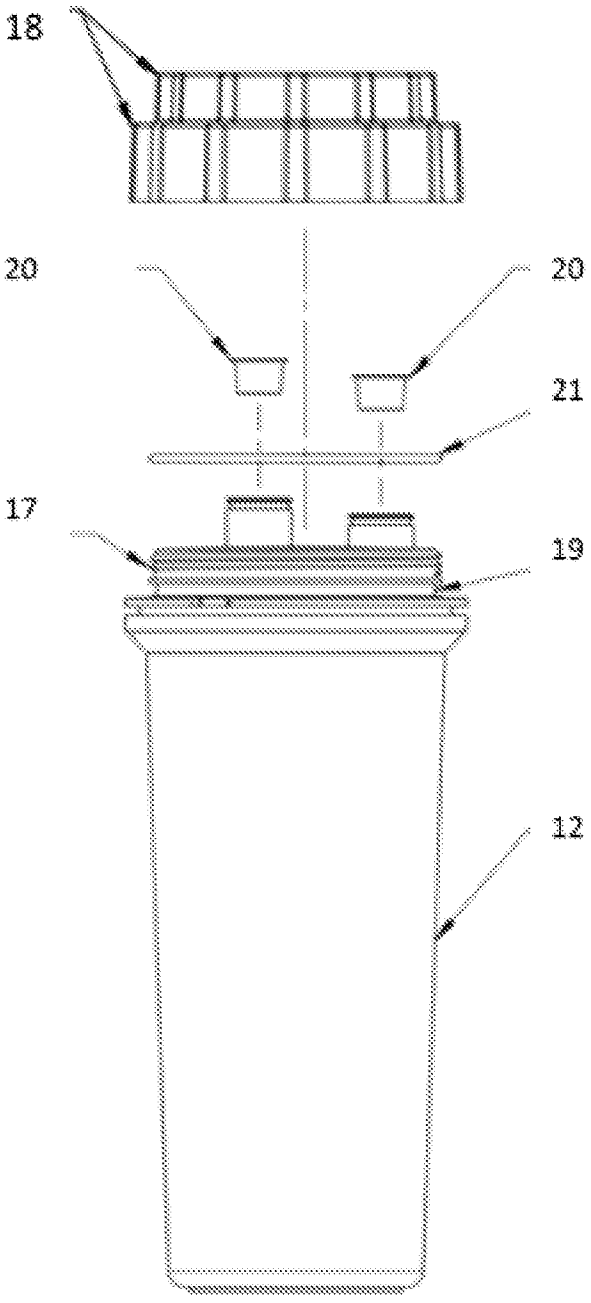


FIG. 4A

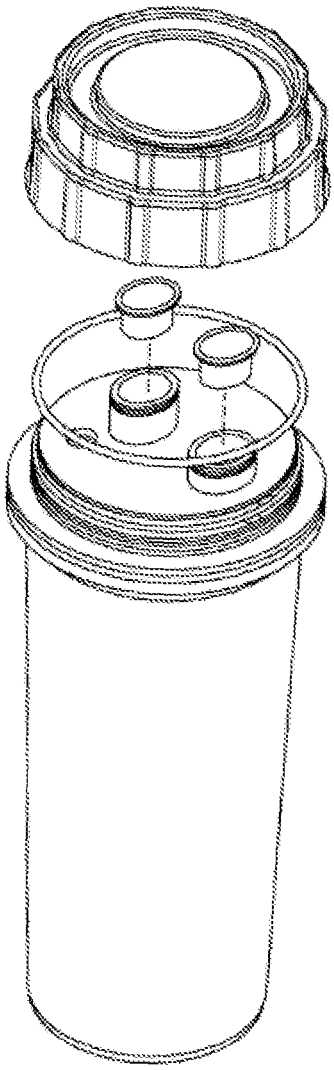


FIG. 4B

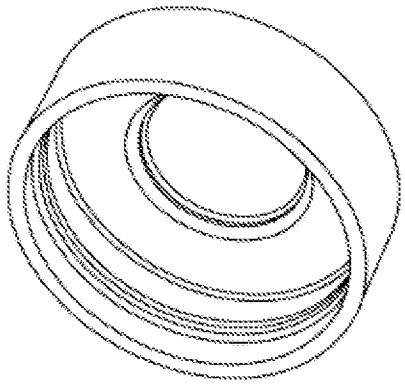


FIG. 5A

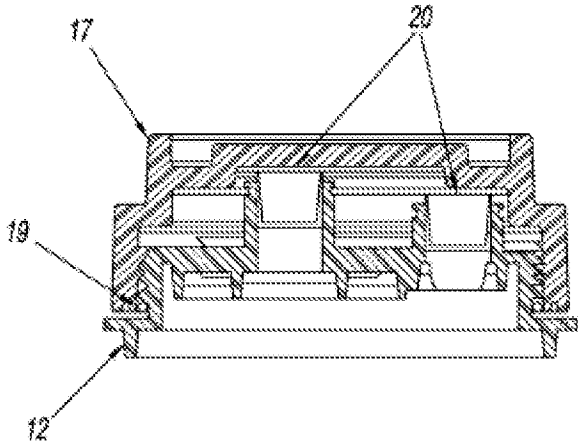


FIG. 5B

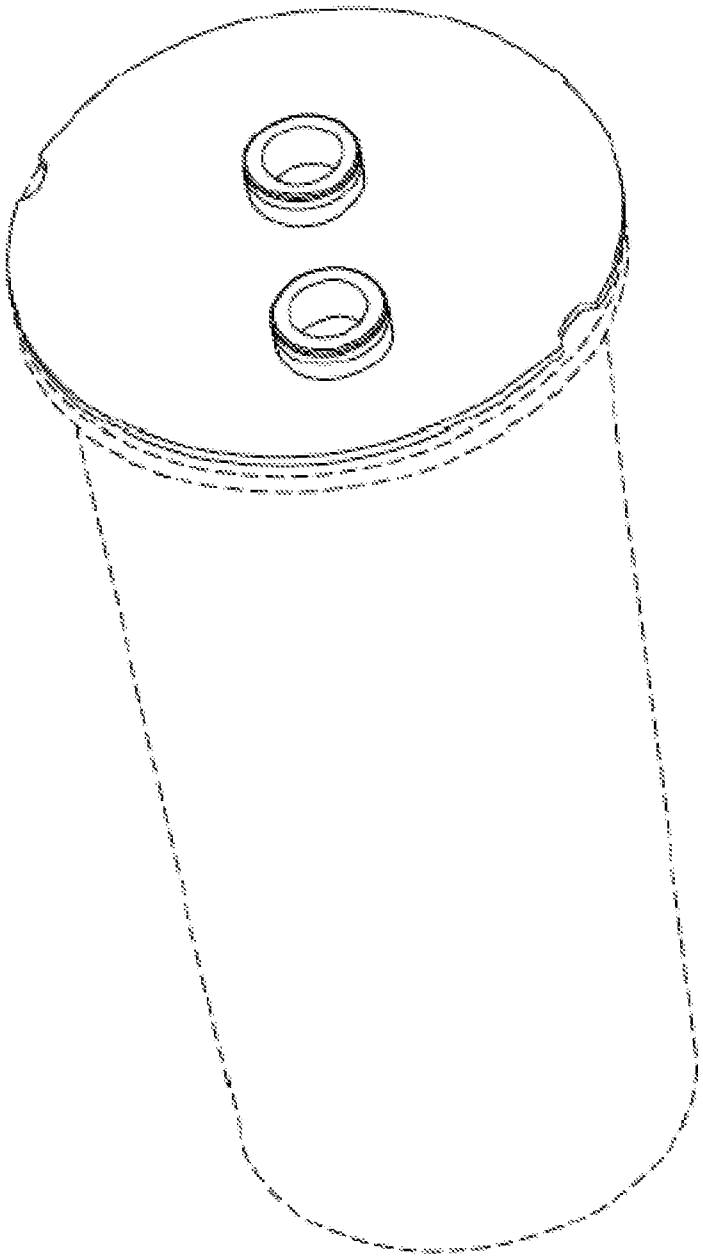


FIGURE 6A

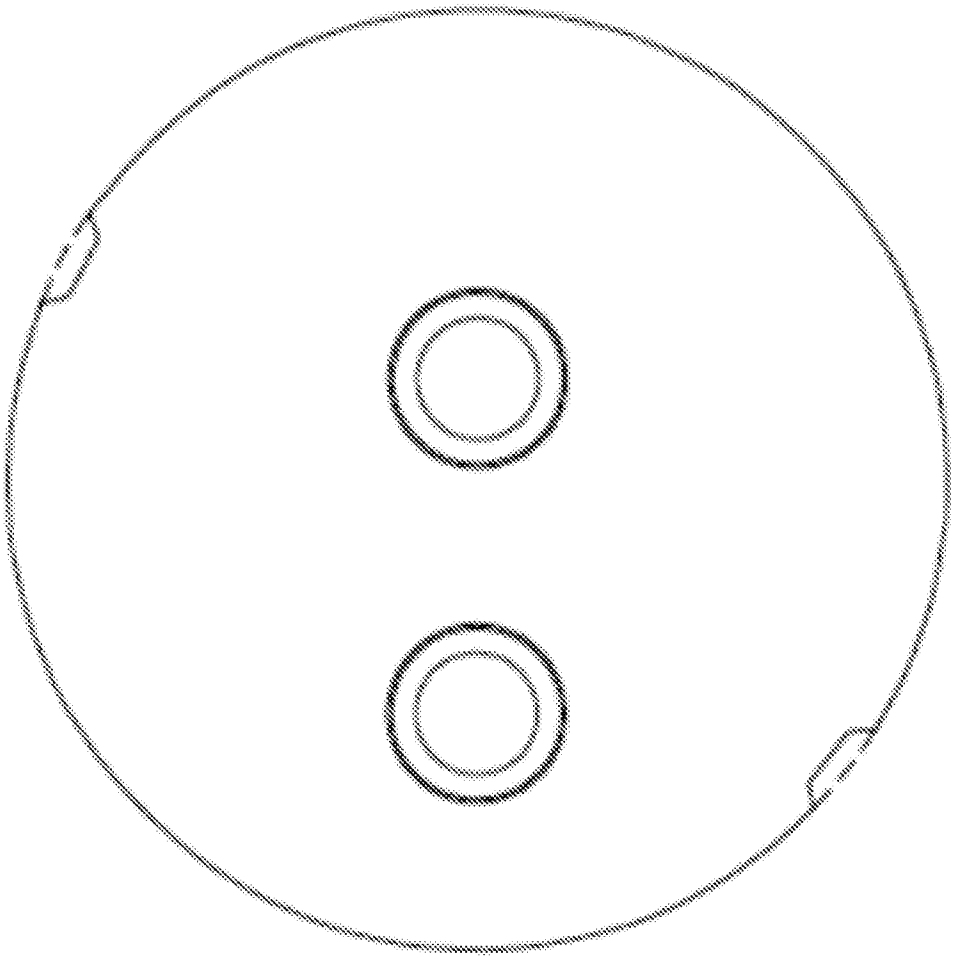


FIGURE 6B

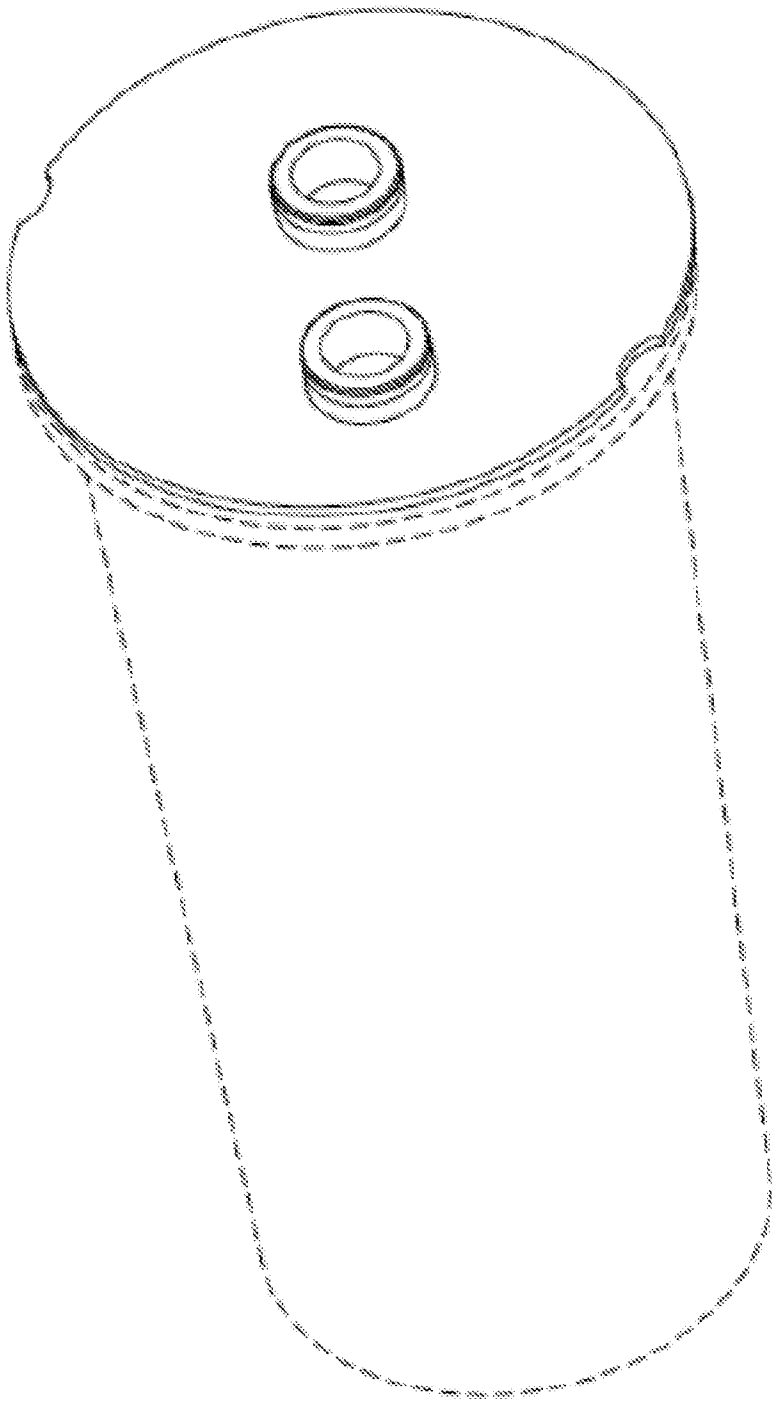


FIGURE 7A

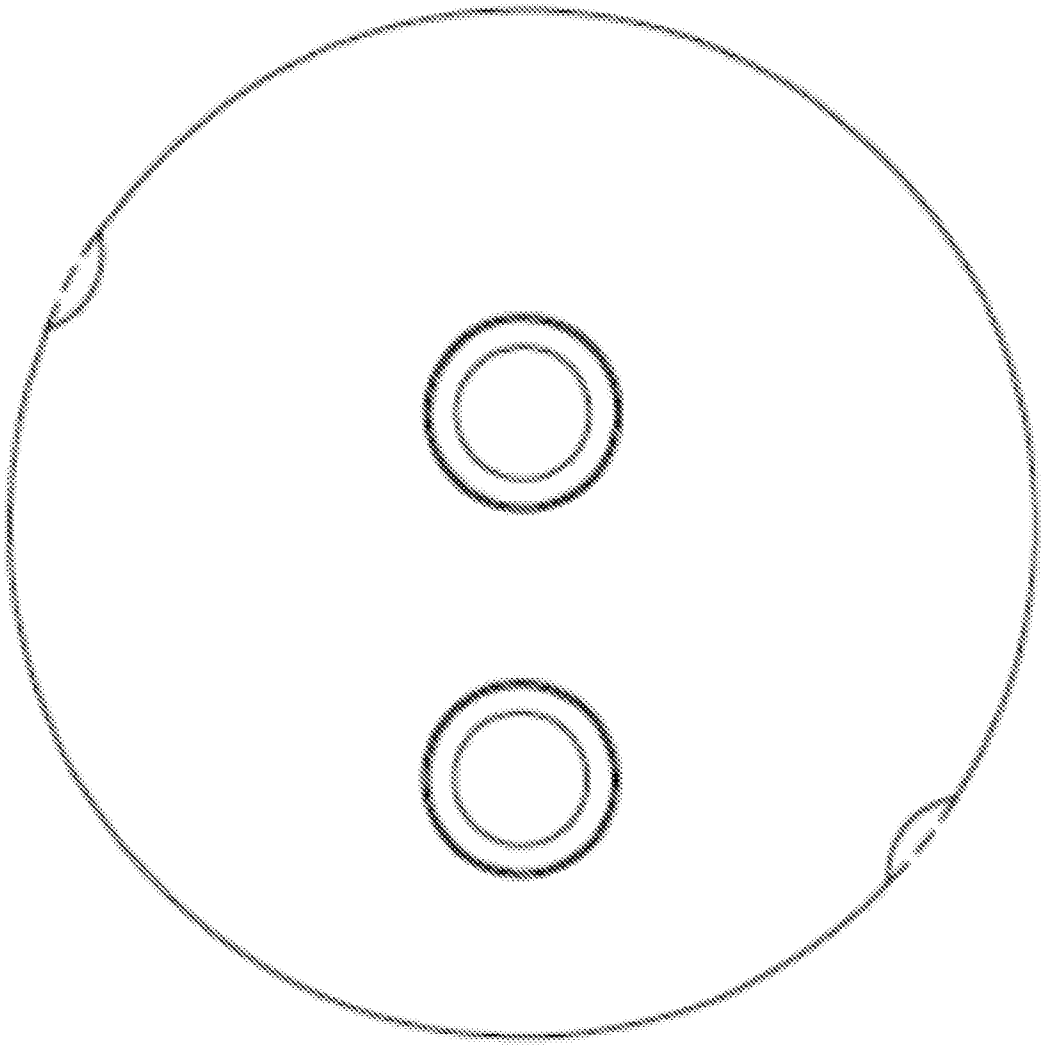


FIGURE 7B

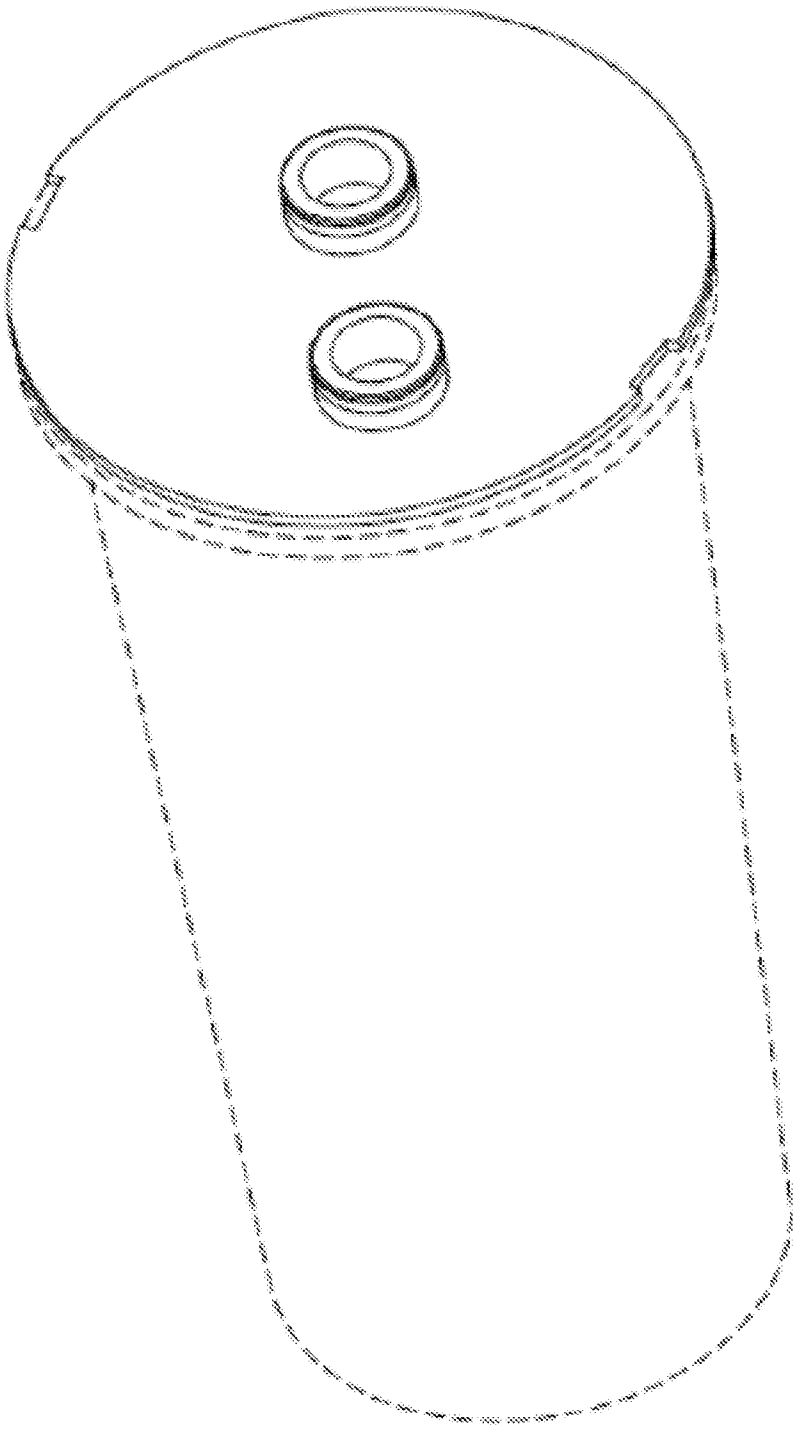


FIGURE 8A

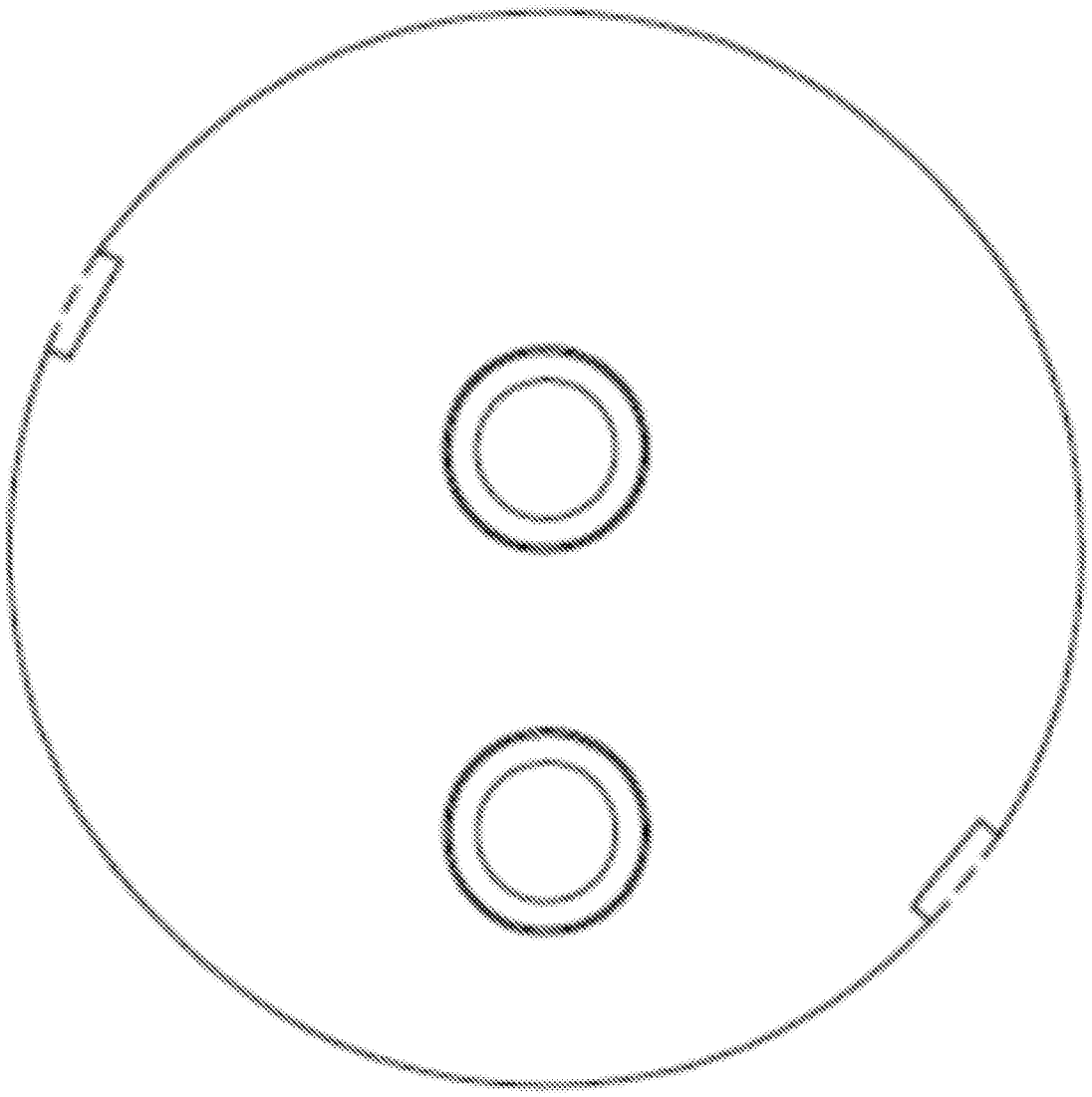


FIGURE 8B

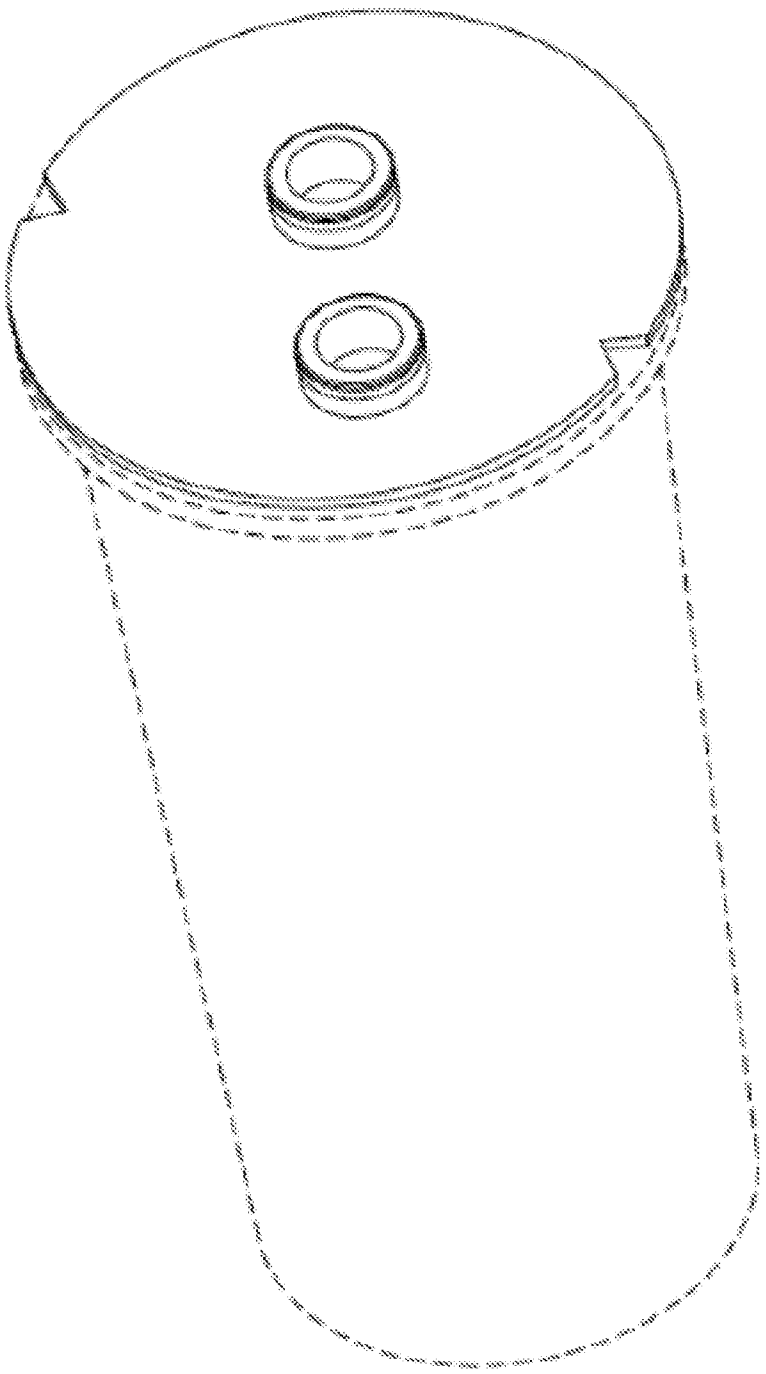


FIGURE 9A

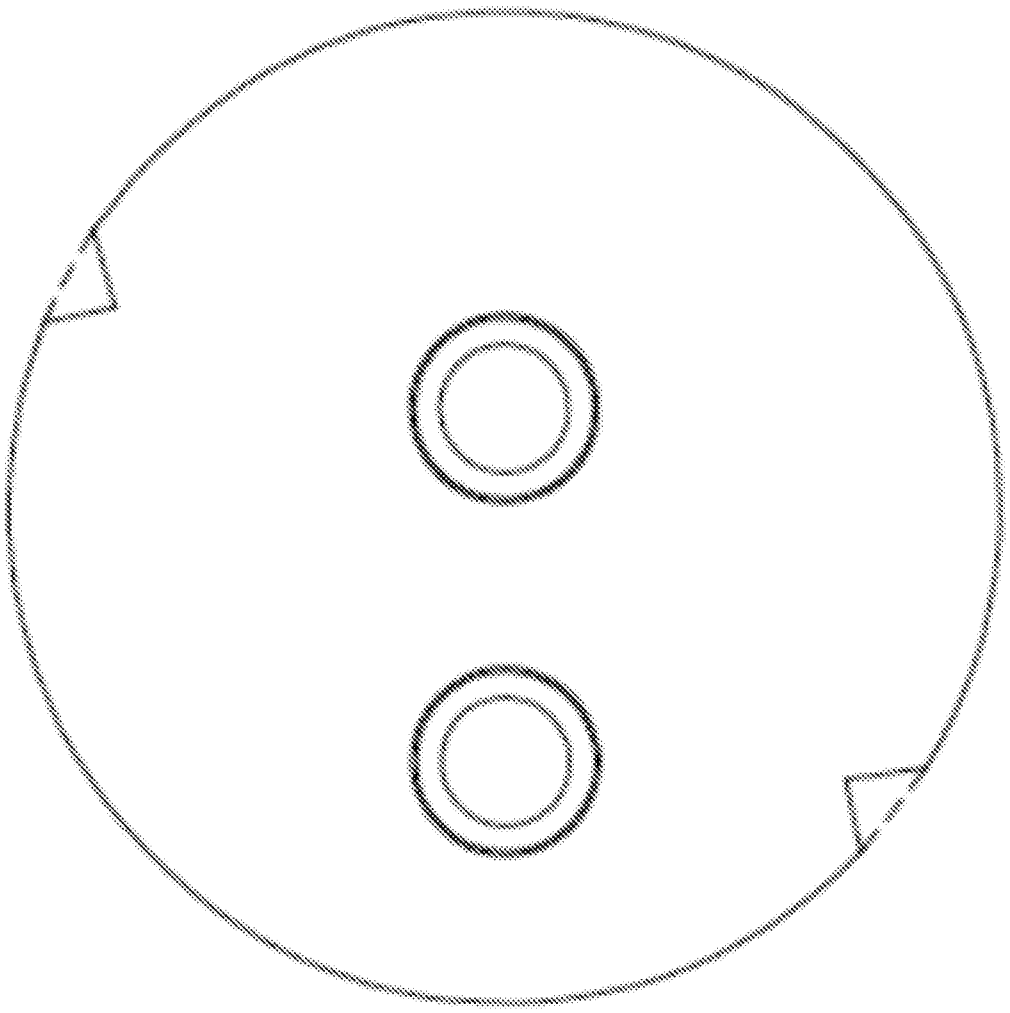


FIGURE 9B

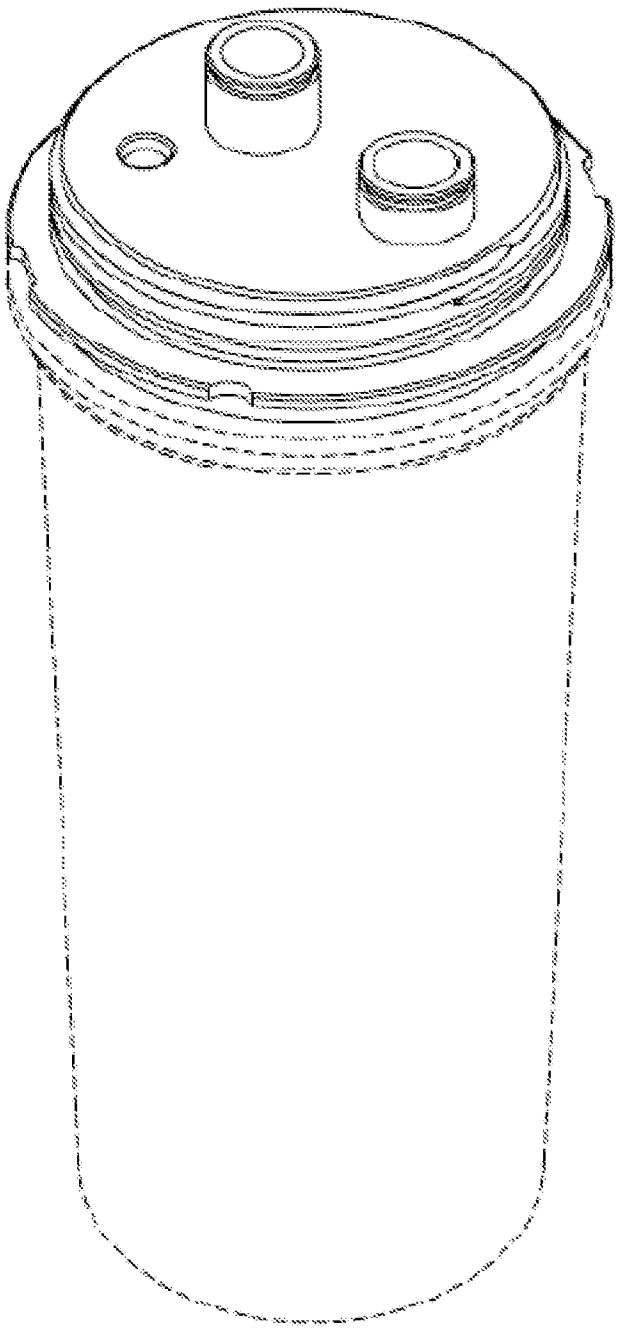


FIGURE 10A

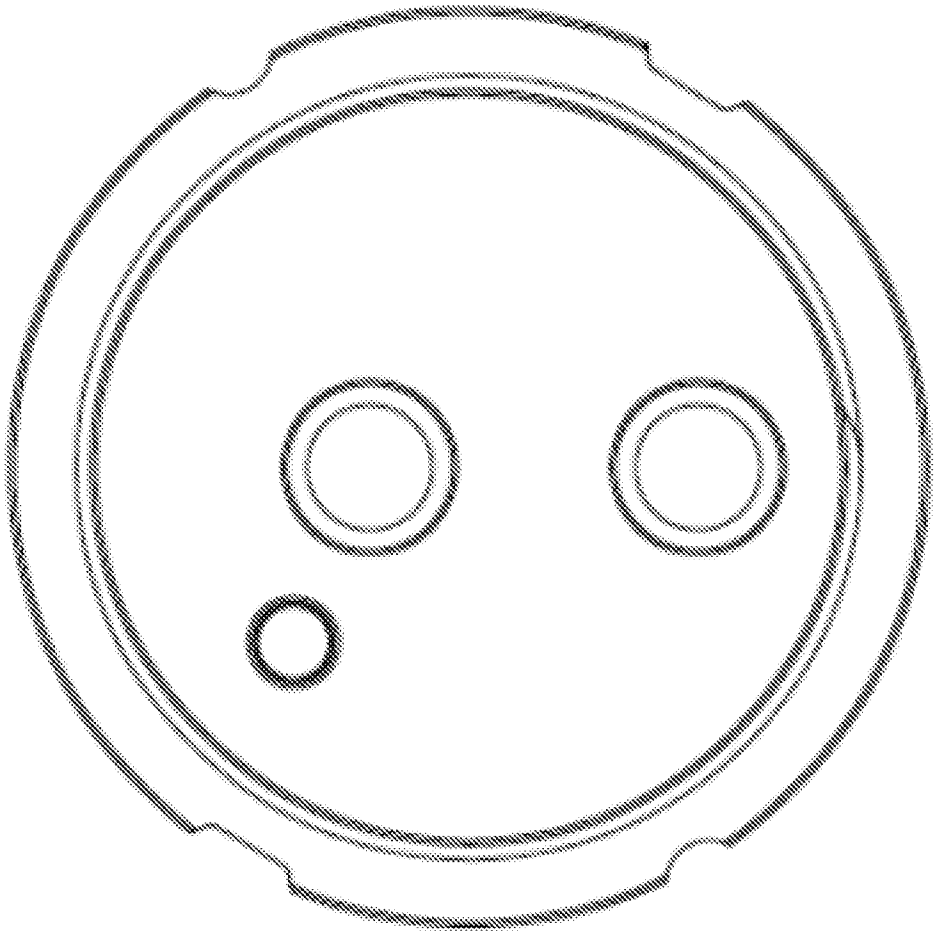


FIGURE 10B

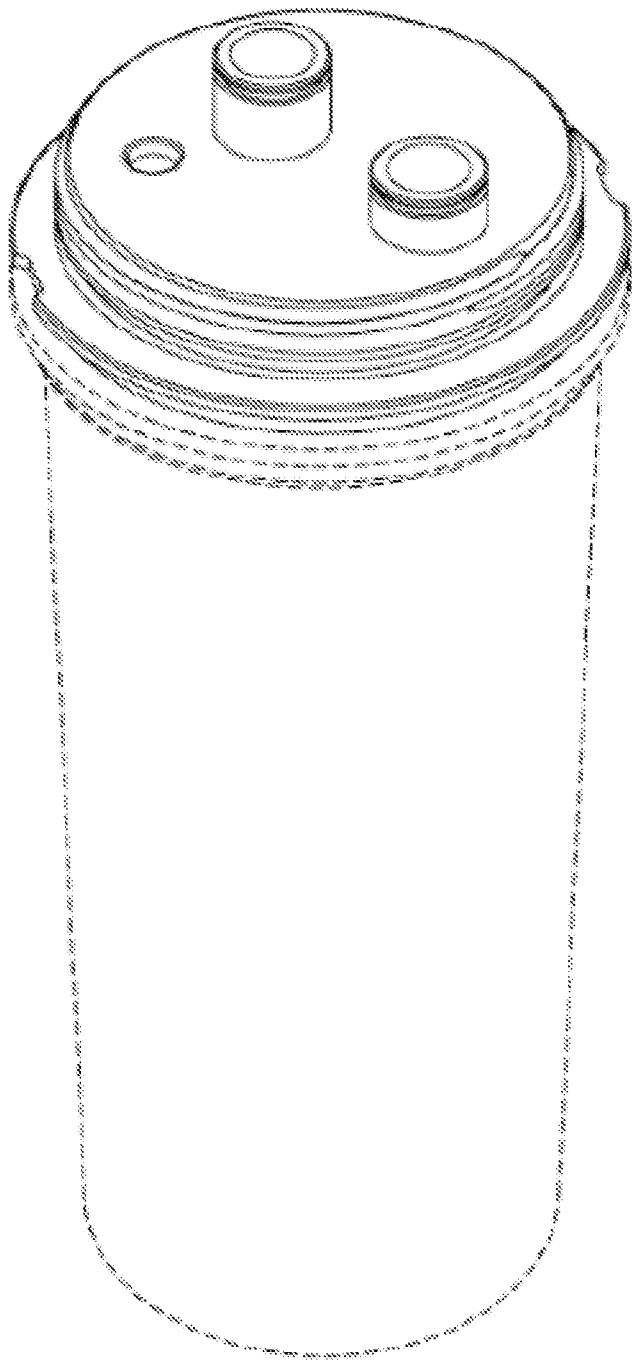


FIGURE 11A

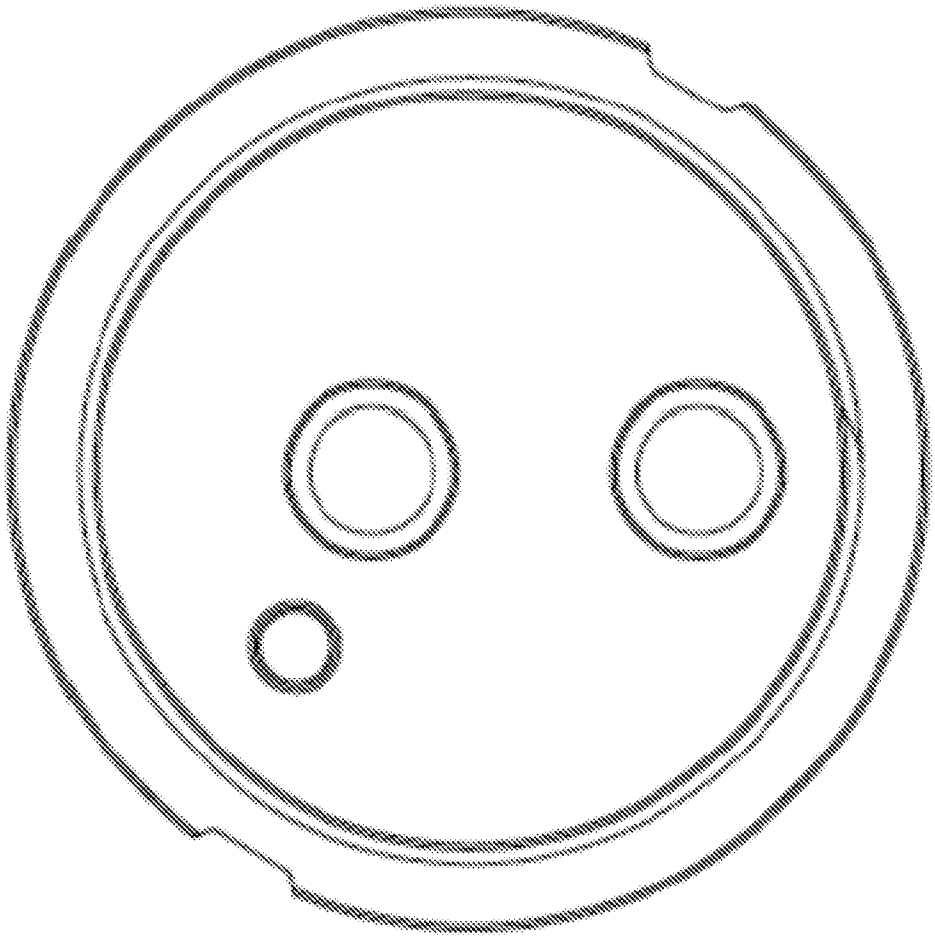


FIGURE 11B

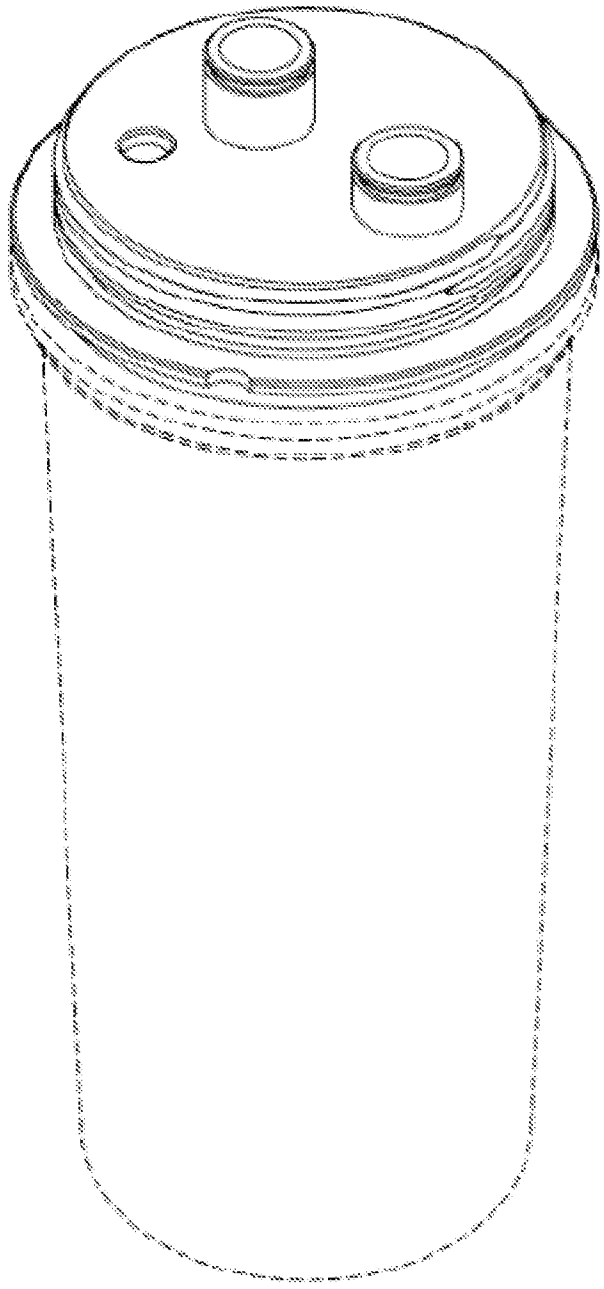


FIGURE 12A

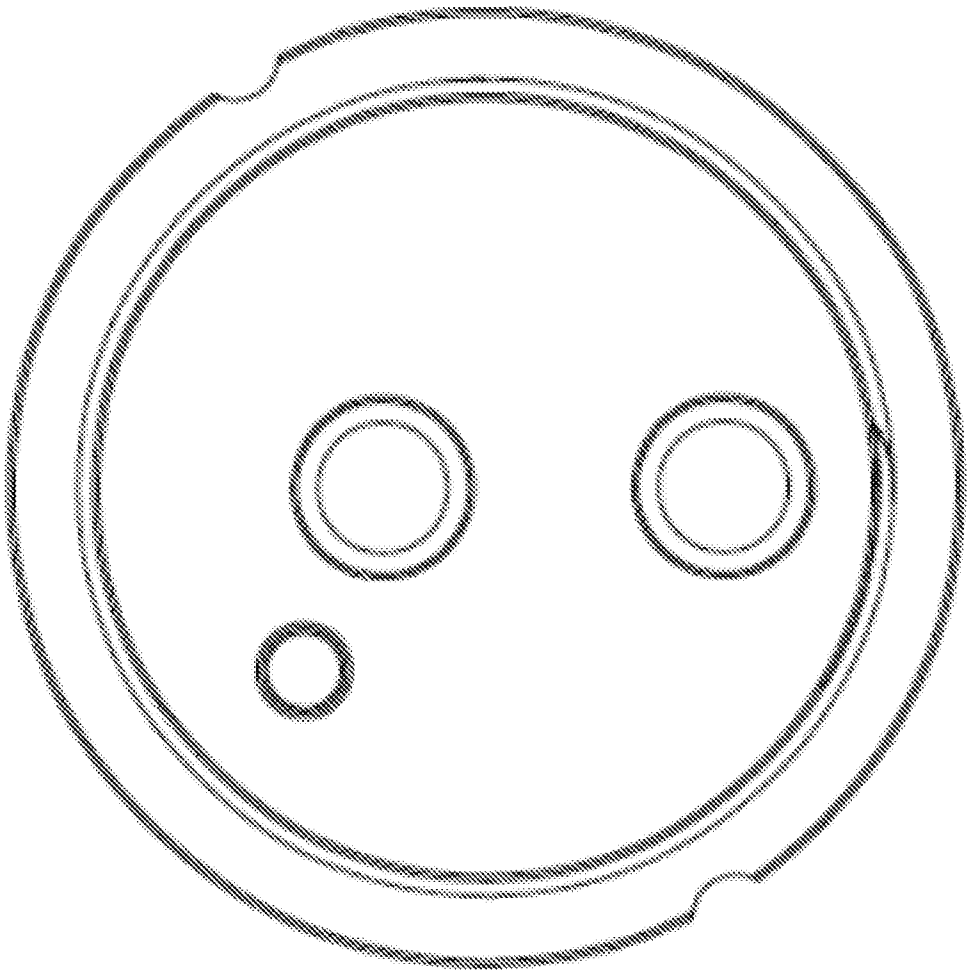


FIGURE 12B

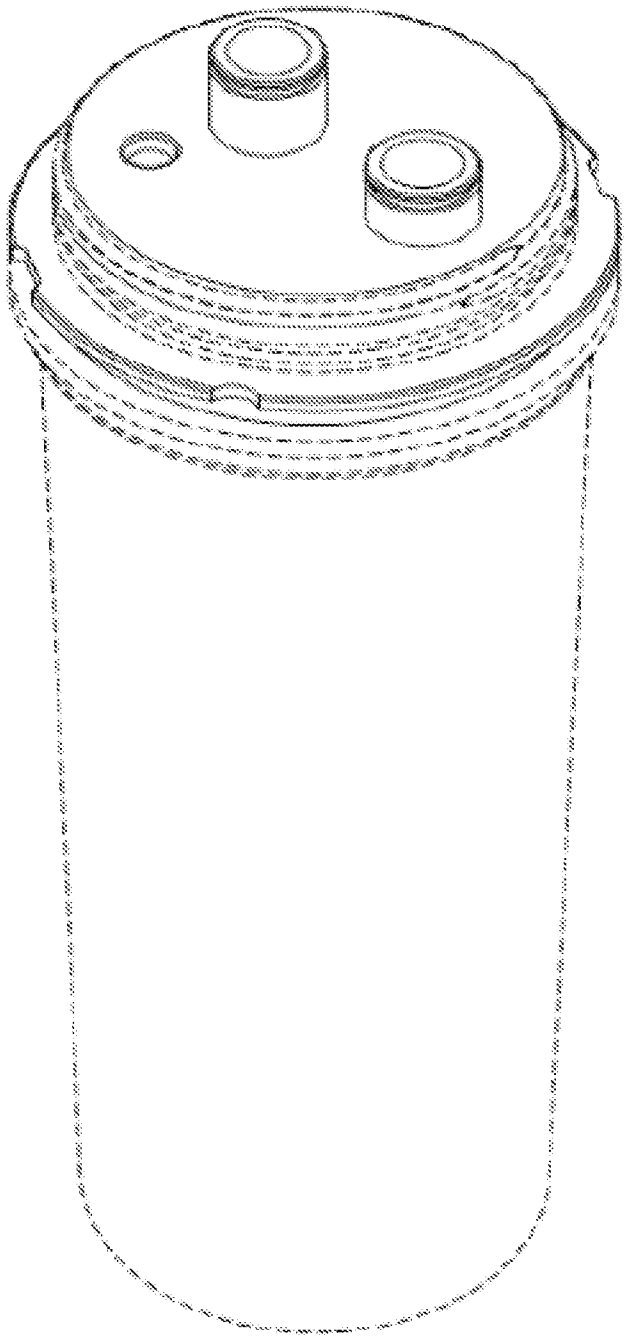


FIGURE 13A

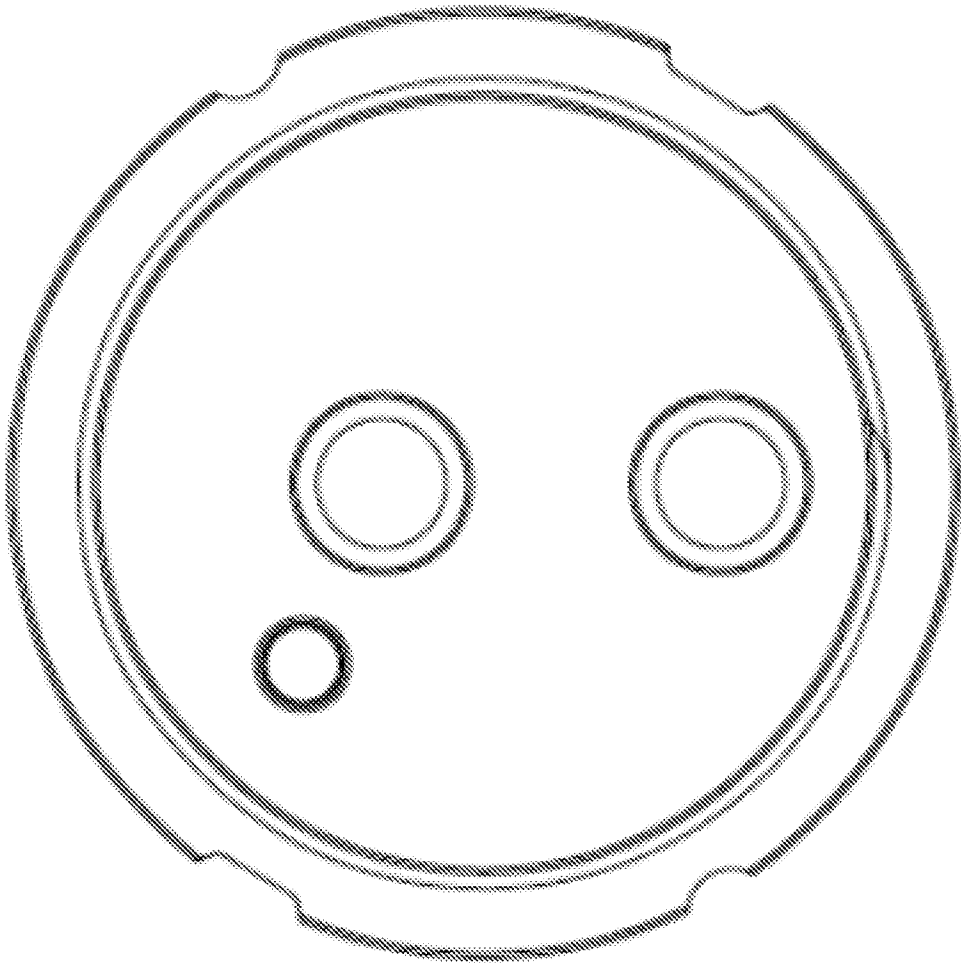


FIGURE 13B

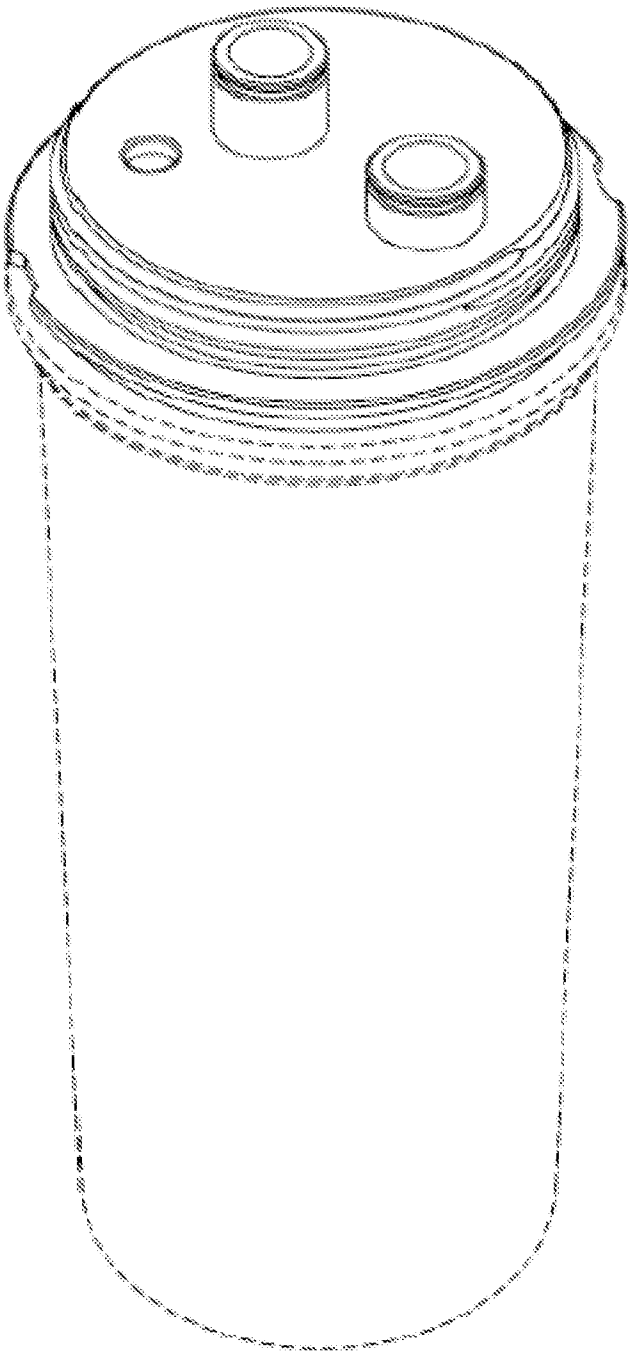


FIGURE 14A

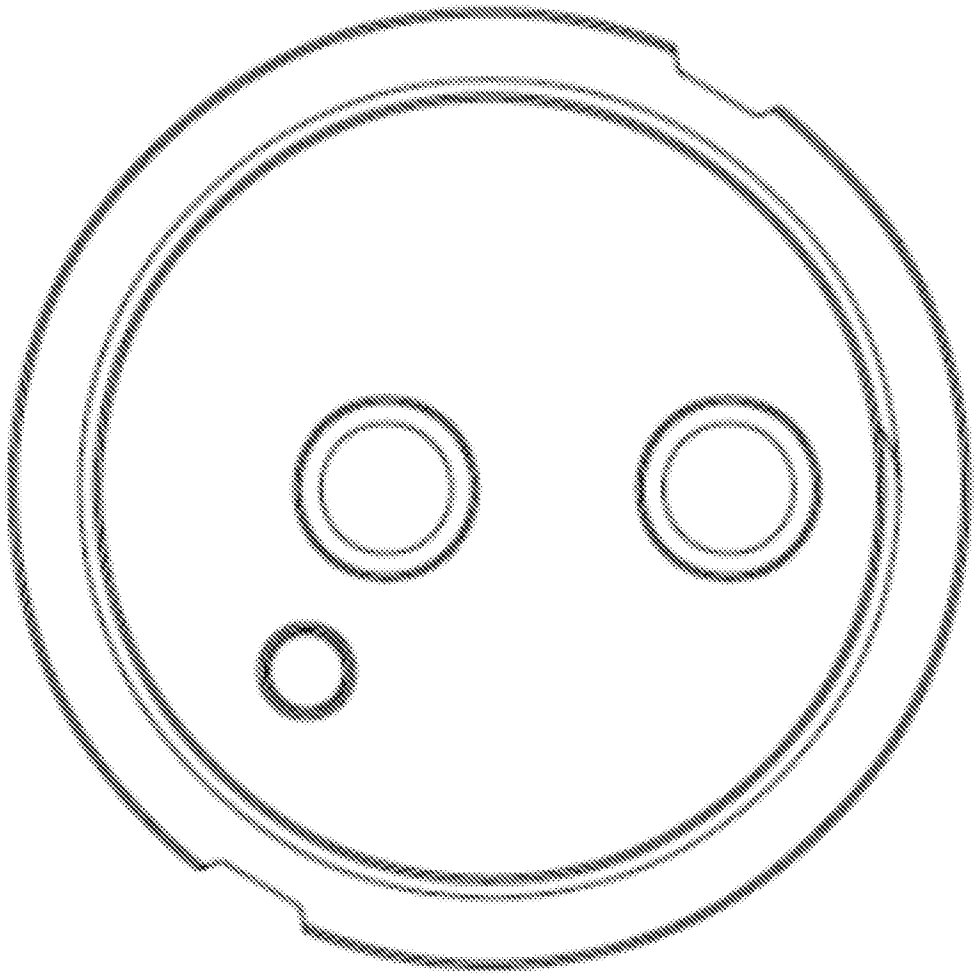


FIGURE 14B

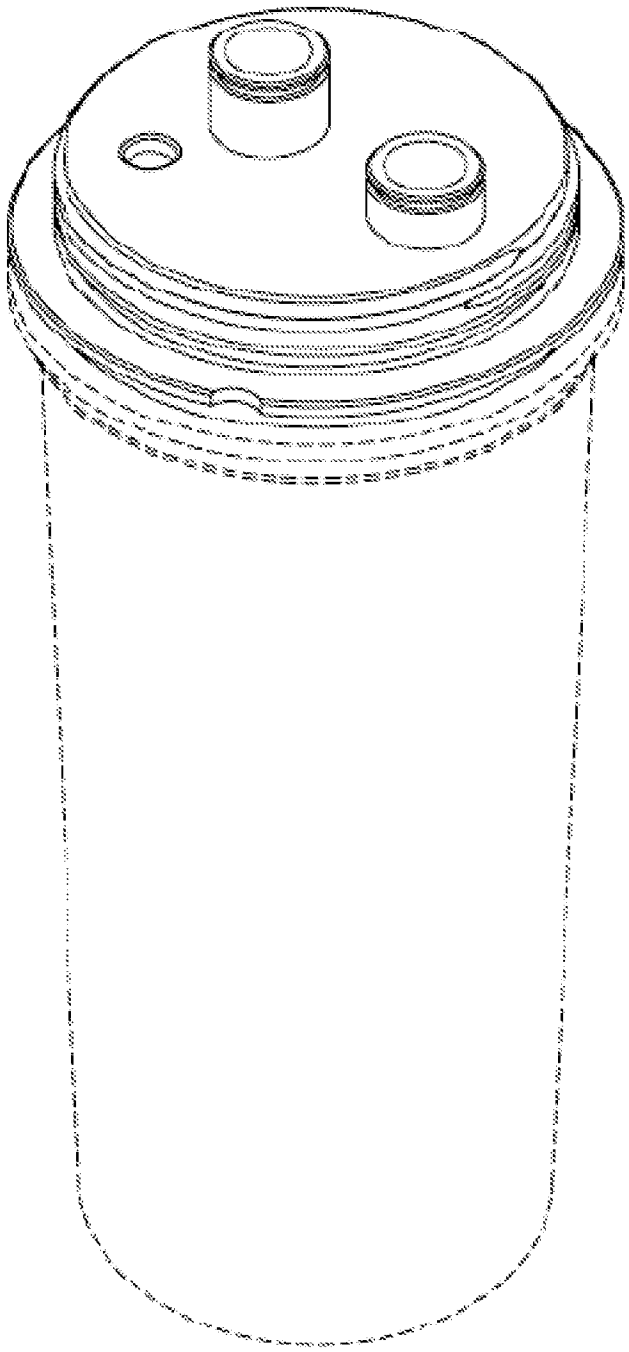


FIGURE 15A

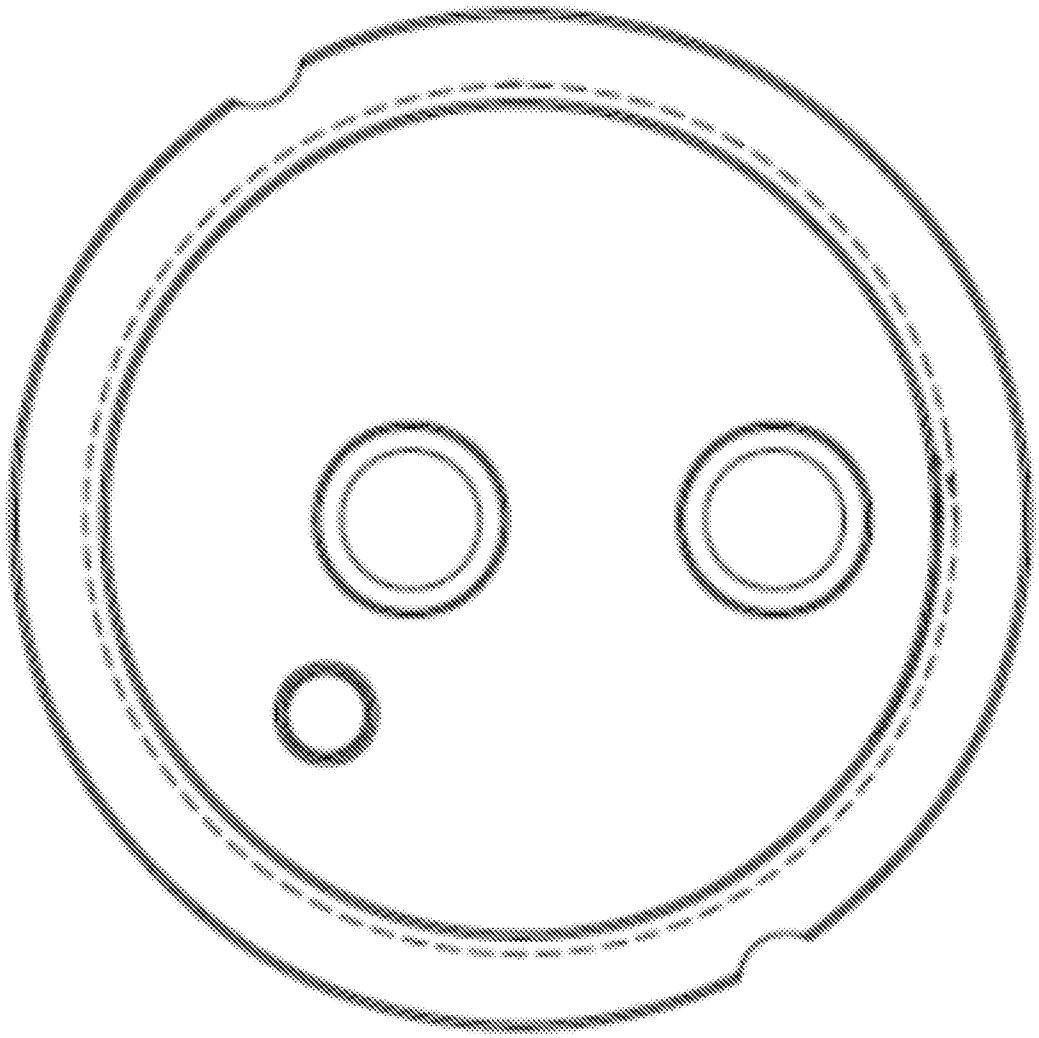


FIGURE 15B

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A1	54,414 A	05/01/1866	Sangster
	A2	D024,111	03/12/1895	Landgraf
	A3	1,032,879 A	07/16/1912	Carlton
	A4	2,467,547 A	04/19/1949	Birnbaum
	A5	D189,743 S	02/14/1961	Happe
	A6	3,665,682 A	05/30/1972	Ciavattoni
	A7	3,870,486 A	03/11/1975	Eriksson
	A8	3,988,134 A	10/26/1976	Gandrud
	A9	4,083,705 A	04/11/1978	Parise
	A10	4,097,381 A	06/27/1978	Ritzler
	A11	4,226,054 A	10/07/1980	Coty
	A12	4,326,952 A	04/27/1982	Blake
	A13	4,385,891 A	05/31/1983	Ligotti
	A14	4,599,170 A	07/08/1986	Friedman
	A15	D286,268 S	10/21/1986	Wolff
	A16	D288,528 S	03/03/1987	Parad
	A17	D288,529 S	03/03/1987	Parad
	A18	4,753,632 A	06/28/1988	Hofmann
	A19	4,761,235 A	08/02/1988	Haentjens
	A20	D306,266 S	02/27/1990	Hargrove
	A21	D306,649 S	03/13/1990	Lapicola
	A22	4,911,315 A	03/27/1990	Shrum
	A23	4,934,545 A	06/19/1990	Pezzoli
	A24	4,951,845 A	08/28/1990	Pezzoli
	A25	4,957,621 A	09/18/1990	Rohloff
	A26	5,018,971 A	05/28/1991	Trawoeger
	A27	5,114,578 A	05/19/1992	Sundstrom
	A28	5,125,522 A	06/30/1992	Pezzoli

EXAMINER:	**DATE CONSIDERED:**

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A29	D341,085 S	11/09/1993	Charbonneau
	A30	5,330,641 A	07/19/1994	Cattani
	A31	D349,647 A	08/16/1994	Moffitt
	A32	5,343,592 A	09/06/1994	Parise
	A33	5,421,996 A	06/06/1995	Trawoeger
	A34	D359,236 S	06/13/1995	Spafford
	A35	5,484,282 A	01/16/1996	Trawoger
	A36	5,509,551 A	04/23/1996	Terrell, II
	A37	D372,426 S	08/06/1996	Garnett
	A38	D374,481 S	10/08/1996	McCallister
	A39	5,613,851 A	03/25/1997	Trawoeger
	A40	D384,280 S	09/30/1997	Kuczer
	A41	5,730,322 A	03/24/1998	Iba
	A42	5,741,134 A	04/21/1998	Davis
	A43	5,743,735 A	04/28/1998	Vollstedt
	A44	5,795,159 A	08/18/1998	Ralls
	A45	5,797,742 A	08/25/1998	Fraker
	A46	5,873,494 A	02/23/1999	Dallas, Jr.
	A47	5,958,113 A	09/28/1999	Collins
	A48	D423,354 S	04/25/2000	Lin
	A49	6,083,307 A	07/04/2000	Dular
	A50	D428,768 S	08/01/2000	Betras
	A51	D431,158 S	09/26/2000	Schwab
	A52	D433,275 S	11/07/2000	Betras
	A53	6,149,812 A	11/21/2000	Erickson
	A54	D435,194 S	12/19/2000	Betras
	A55	6,409,803 B1	06/25/2002	Tremel
	A56	6,521,131 B1	02/18/2003	Hamilton

EXAMINER:	**DATE CONSIDERED:**

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A57	6,592,754 B2	07/15/2003	Chilibeck
	A58	6,592,769 B2	07/15/2003	Erickson
	A59	6,638,066 B2	10/28/2003	Hubner
	A60	6,660,160 B1	12/09/2003	Ernryd
	A61	6,692,636 B2	02/17/2004	Chilibeck
	A62	6,790,038 B2	09/14/2004	Hubner
	A63	6,797,178 B2	09/28/2004	Albiston
	A64	D503,097 S	03/22/2005	Burr
	A65	D503,110 S	03/22/2005	Burr
	A66	6,946,069 B2	09/20/2005	Chilibeck
	A67	D522,359 S	06/06/2006	Van Diepen
	A68	7,063,793 B2	06/20/2006	Albiston
	A69	7,080,425 B2	07/25/2006	Smith
	A70	7,131,839 B2	11/07/2006	March
	A71	7,156,214 B2	01/02/2007	Pradel
	A72	7,166,214 B2	01/23/2007	Armstrong
	A73	D536,247 S	02/06/2007	Burr
	A74	7,182,599 B2	02/27/2007	Stone
	A75	7,306,460 B2	12/11/2007	Hubner
	A76	D574,237 S	08/05/2008	Yates, III
	A77	7,422,615 B2	09/09/2008	Kim
	A78	7,604,674 B2	10/20/2009	Han
	A79	7,753,976 B2	07/13/2010	Hyun
	A80	7,767,079 B2	08/03/2010	Darcy
	A81	D630,094 S	01/04/2011	Maxwell
	A82	8,393,898 B2	03/12/2013	McCary
	A83	8,636,837 B2	01/28/2014	Nonnenmacher
	A84	8,692,636 B2	02/17/2004	Chilbeck

EXAMINER:	**DATE CONSIDERED:**

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

U.S. PATENTS				
Examiner Initial	**Cite No.**	**Patent Number**	**Issue Date**	**First Named Inventor**
	A85	D705,059 S	05/20/2014	Hutchinson
	A86	D706,135 S	06/03/2014	Hutchinson
	A87	D727,149 S	04/21/2015	Humm
	A88	D750,962 S	03/08/2016	Liu
	A89	9,332,969 B2	05/10/2016	Han
	A90	D835,264 S	12/04/2018	Mozzicato
	A91	D835,778 S	12/11/2018	Mozzicato
	A92	D835,779 S	12/11/2018	Mozzicato
	A93	D840,533 S	02/12/2019	Mozzicato
	A94	D840,534 S	02/12/2019	Mozzicato
	A95	D848,612 S	05/14/2019	Mozzicato
	A96	10,342,647 B2	07/09/2019	Stolarik
	A97	10,646,313 B2	05/12/2020	Mozzicato
	A98	10,779,923 B2	09/22/2020	Mozzicato
	A99	11,278,382 B2	03/22/2022	Stolarik

U.S. PATENT APPLICATION PUBLICATIONS				
Examiner Initial	**Cite No.**	**Patent Application Publication Number**	**Publication Date**	**First Named Inventor**
	B1	2001/0047956 A1	12/06/2001	Albiston
	B2	2002/0185186 A1	12/12/2002	Juliar
	B3	2003/0003417 A1	01/02/2003	Hubner
	B4	2004/0259052 A1	12/23/2004	Hubner
	B5	2005/0016913 A1	01/27/2005	Giesel
	B6	2006/0065594 A1	03/30/2006	Armstrong
	B7	2010/0264074 A1	10/21/2010	Darcy
	B8	2014/0154641 A1	06/05/2014	Bogen
	B9	2015/0320638 A1	11/12/2015	Becker
	B10	2018/0098831 A1	04/12/2018	Mozzicato

EXAMINER:	**DATE CONSIDERED:**

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

U.S. PATENT APPLICATION PUBLICATIONS				
Examiner Initial	**Cite No.**	**Patent Application Publication Number**	**Publication Date**	**First Named Inventor**
	B11	2022/0211476 A1	07/07/2022	Stolarik

FOREIGN PATENT DOCUMENTS					
Examiner Initial	**Cite No.**	**Foreign Document Number**	**Publication Date**	**Country**	**Translation**
	C1	CA 2442513 A1	03/23/2005	CA	N/A
	C2	EP 1366728 A1	12/03/2003	EP	N/A
	C3	WO 1983/002720 A1	08/18/1983	PCT	N/A
	C4	WO 1994/016643 A1	08/04/1994	PCT	English abstract only
	C5	WO 2018/006106 A1	01/11/2018	PCT	N/A

OTHER DOCUMENTS (including publisher, author (if any), title, relevant pages, date, and place of publication)		
Examiner Initial	**Cite No.**	**Document Information**
	D1	"International Standard ISO 11143: Dentistry – Amalgam separators"; Second edition; ISO Copyright Office, Switzerland; 2008/07/01; (32 pages)
	D2	Solmetex; "Solmetex Hg5 Amalgam Separator, Type 2 – Maximum Flow = 1000 ml/min: Installation and Maintenance Instructions"; Northborough, Massachusetts; Revised April 27, 2012 (8 pages)
	D3	ASME USAS B17-1; "Keys and Keys Seals": American Society of Mechanical Engineers; USA Standard, 1967 (Reaffirmed 2013)

EXAMINER:	**DATE CONSIDERED:**

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

(19) Canadian Intellectual Property Office
An Agency of Industry Canada

Office de la Propri,t, Intellectuelle du Canada
Un organisme d'Industrie Canada

(11) CA 2 442 513 (13) A1

(40) 23.03.2005
(43) 23.03.2005

(12)

(21) 2 442 513

(51) Int. Cl.7: A61C 19/00

(22) 23.09.2003

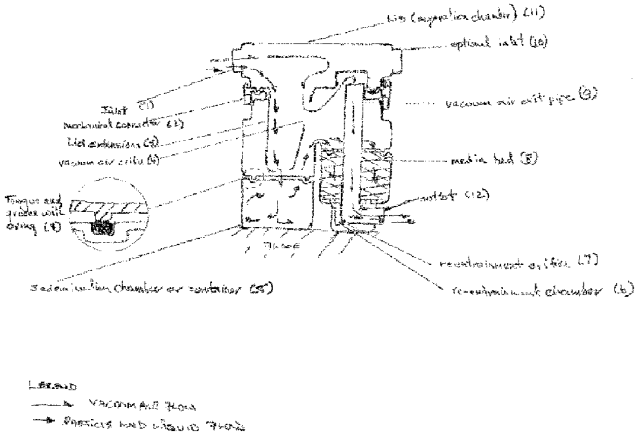
(71) BARRETT, RICHARD,
22 Stonegate Street, GORMLEY, O1 (CA).

(72) BARRETT, RICHARD (CA).

(54) SEPARATEUR D'AMALGAME
(54) AMALGAM SEPARATOR

(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.



PGR2023-00055 - Ex. 1002
Page 250 of 346

Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2442513 A1 2005/03/23

(21) 2 442 513

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2003/09/23

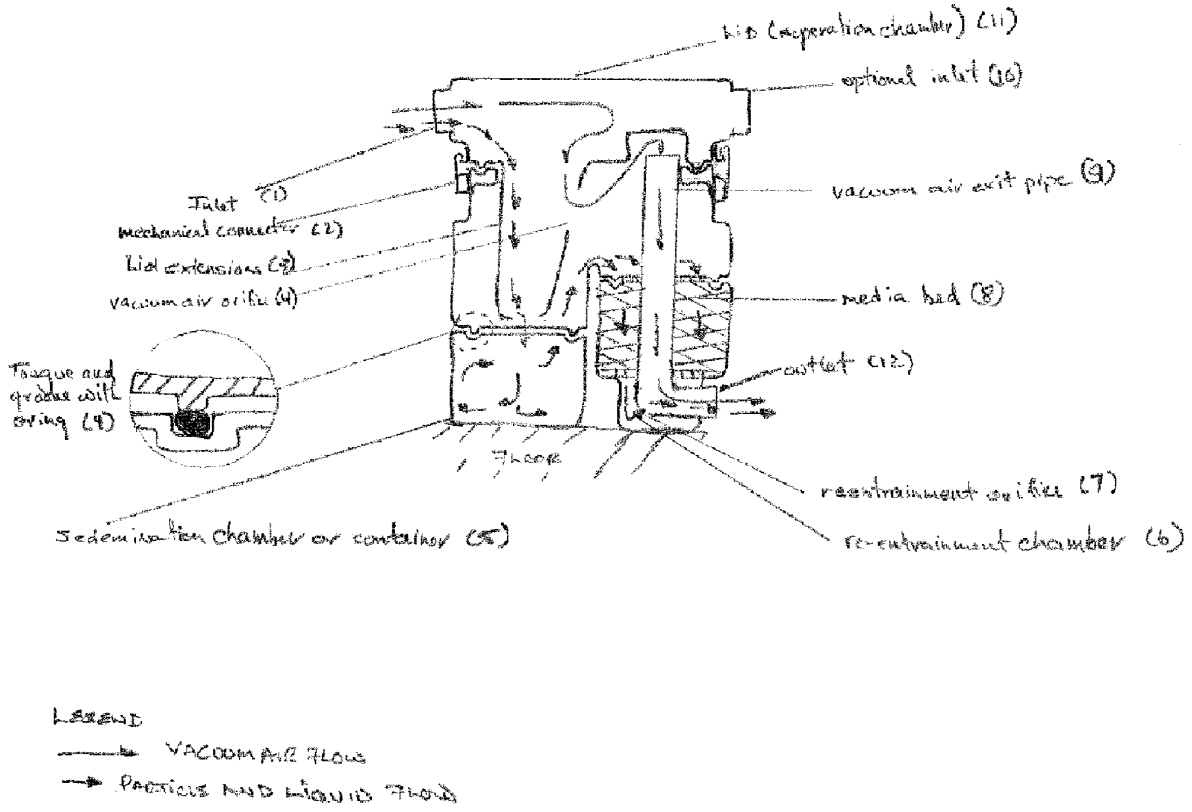
(41) Mise à la disp. pub./Open to Public Insp.: 2005/03/23

(51) Cl.Int.^{7}/Int.Cl.^{7} A61C 19/00

(71) Demandeur/Applicant:
BARRETT, RICHARD, CA

(72) Inventeur/Inventor:
BARRETT, RICHARD, CA

(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

(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.

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.

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

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.

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

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.

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

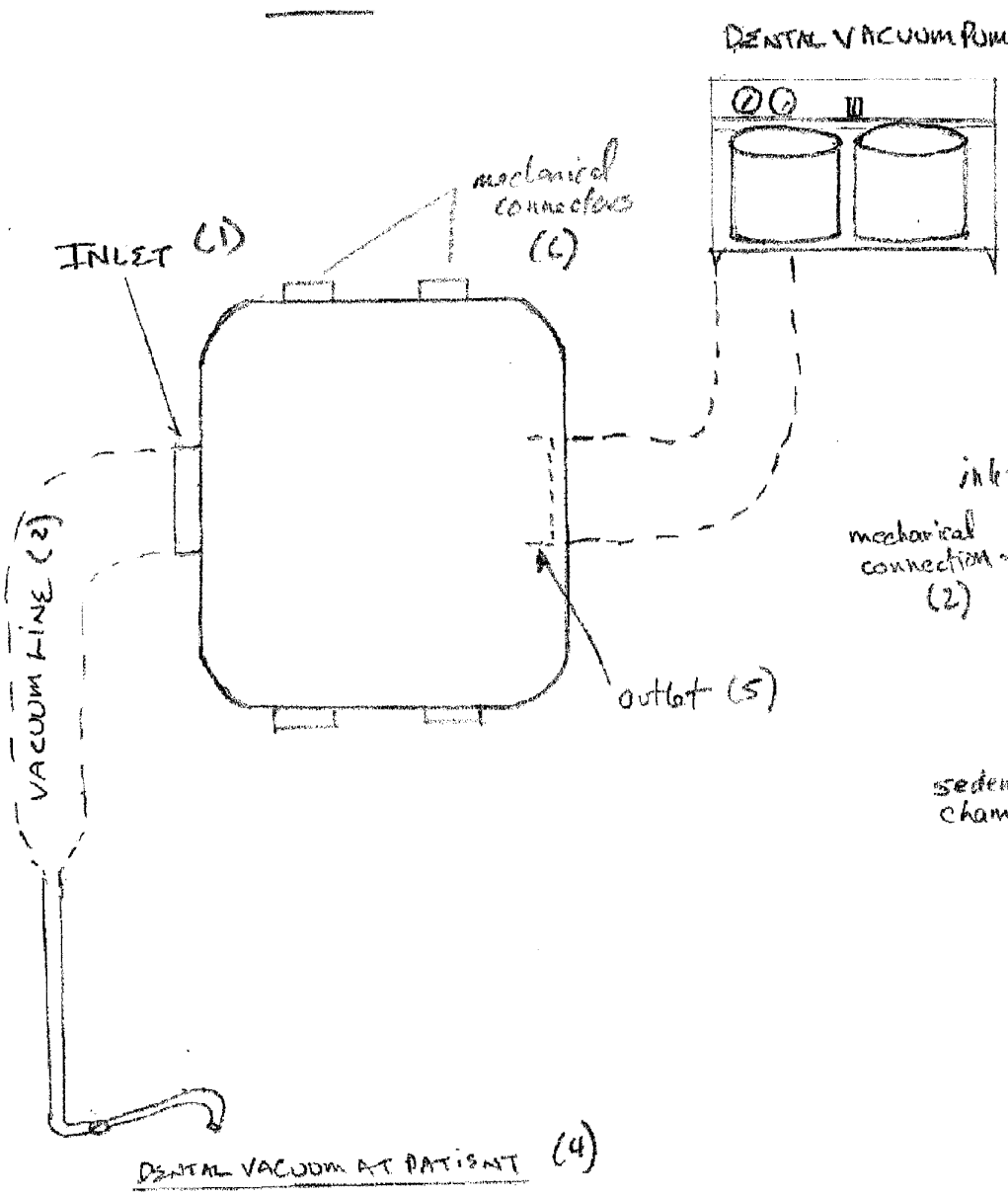
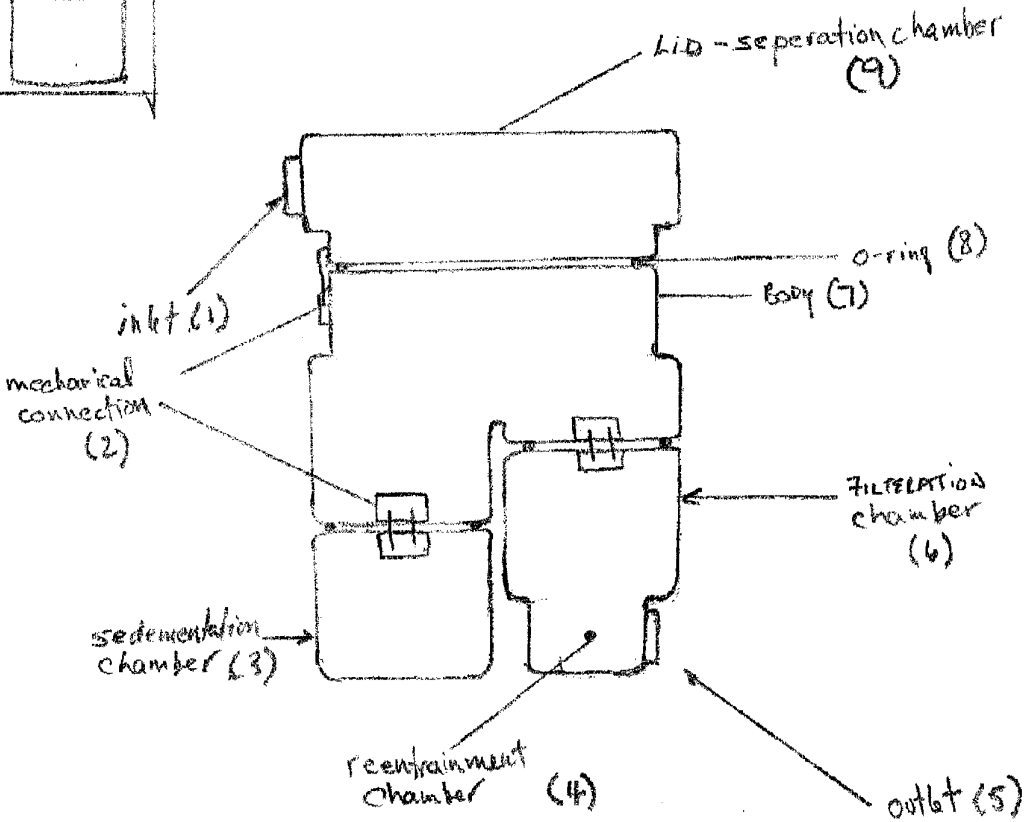


FIG 2



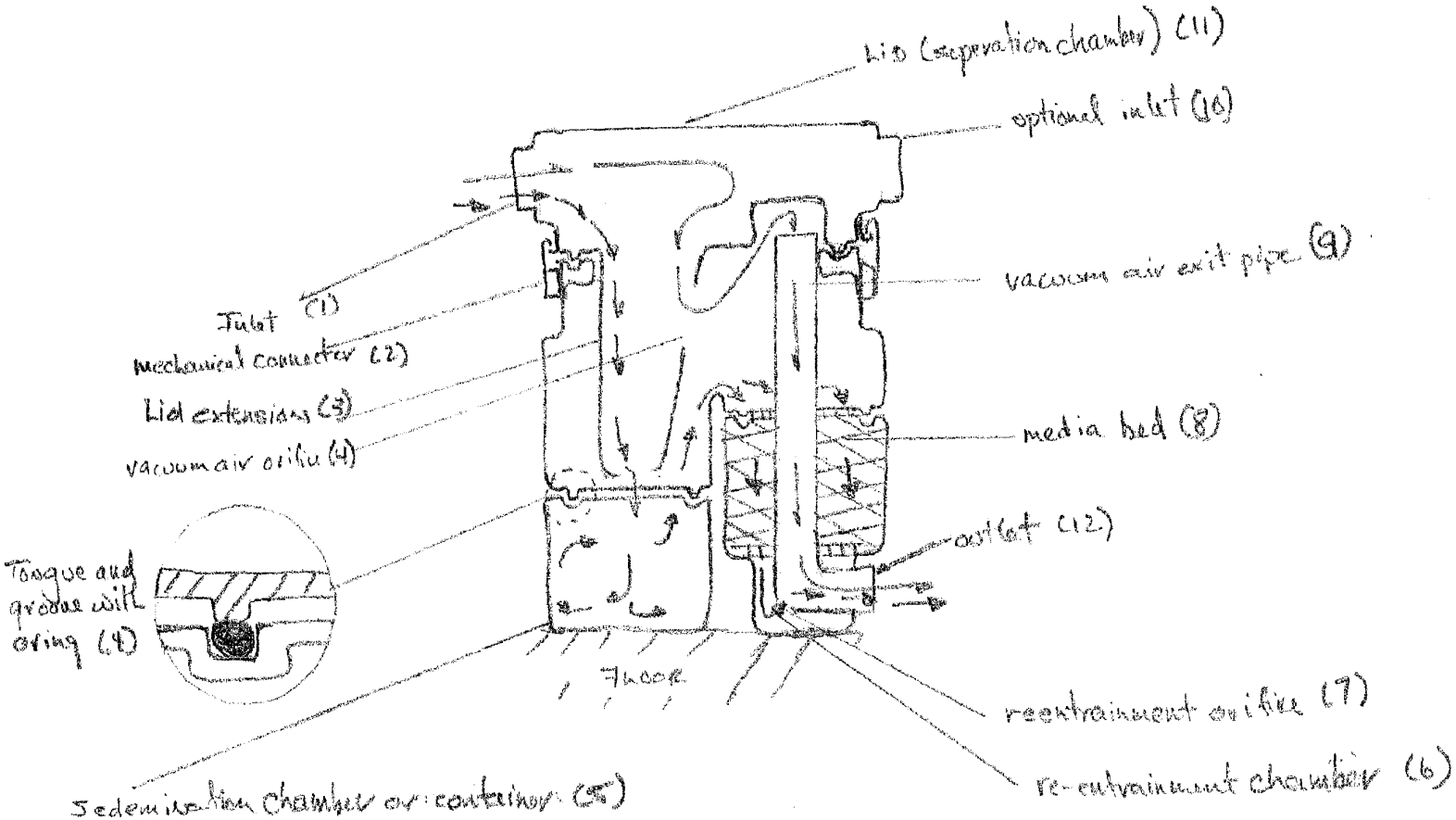
DRAWING

AMALGAM SEPERATOR TOP ½ SIDE VIEW

RICHARD BARDSLEY

PGR2023-00055 - Ex. 1002
Page 261 of 346

FIG 3



LEGEND

VACUUM AIR FLOW

PARTICLE AND LIQUID FLOW

Drawing

AMALGAM SEPERATOR CROSS SECTION.

RICHMOND BARRETT

CA 02442513 2003-09-23

PGR2023-00055 - Ex. 1002

C2

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 366 728 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.12.2003 Bulletin 2003/49

(51) Int Cl.[7]: **A61C 17/06**, A61C 17/14

(21) Application number: **03010773.4**

(22) Date of filing: **14.05.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **27.05.2002 IT PC20020016**

(71) Applicant: **Bartocci, Ezio**
29100 Piacenza PC (IT)

(72) Inventor: **Bartocci, Ezio**
29100 Piacenza PC (IT)

(74) Representative: **La Ciura, Salvatore**
Via Francesco Sforza, 3
20122 Milano (IT)

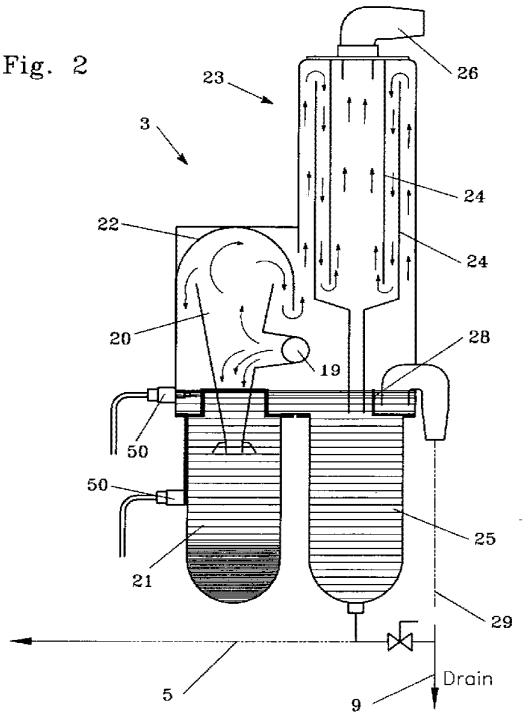
(54) Surgical draining apparatus, in particular for a dental surgery

(57) The invention relates to a surgical suction unit in particular for dental surgeries, comprising:

- a liquid-ring suction pump (2);
- an input unit (1), upstream of said pump (2), connected 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.

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.

Fig. 2



EP 1 366 728 A1

Printed by Jouve, 75001 PARIS (FR)

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 overdimension 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;

PGR2023-00055 - Ex. 1002
Page 264 of 346

- 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.

PGR2023-00055 - Ex. 1002
Page 265 of 346

[0049] The fluids and solid particles aspirated by the 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, in particular for dental surgeries, of the type comprising a liquid-ring suction pump (2), means (1) designed to connect the input of said pump with the various points of use, and means (3) designed to separate the liquids and solids aspirated by said pump from the air, said unit being **characterised in that** said separation devices (3) are located downstream of pump (2).

2. Surgical suction unit as claimed in claim 1, **characterised in that** it includes:

   - a liquid-ring suction pump (2);
   - an input unit (1), upstream of said pump (2), connected 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.

3. Surgical suction unit as claimed in claim 2, **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.

4. Surgical suction unit as claimed in claim 3, **characterised in that** means (6) are installed along the route (5) that connects said liquid and particle col-

PGR2023-00055 - Ex. 1002
Page 266 of 346

lection tank (25) with the inlet of pump (2) to cool said liquid.

5. 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.

6. Surgical suction unit as claimed in claim 5, **characterised 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.

7. Surgical suction unit as claimed in claim 5 or 6, **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.

8. 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.

9. Surgical suction unit as claimed in claim 8, **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.

10. 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).

11. 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.

12. Surgical suction unit as claimed in claim 10, **characterised in that** means (6) designed to cool the liquid conveyed to pump (2) are fitted on said pipe (5).

13. Surgical suction unit as claimed in claim 11, **characterised in that** said tanks (21, 25) are removable.

14. Surgical suction unit as claimed in claim 12, **characterised in that** it includes level gauges (50) for the solid parts in tank (21) and the liquids in tank (25).

PGR2023-00055 - Ex. 1002
Page 267 of 346

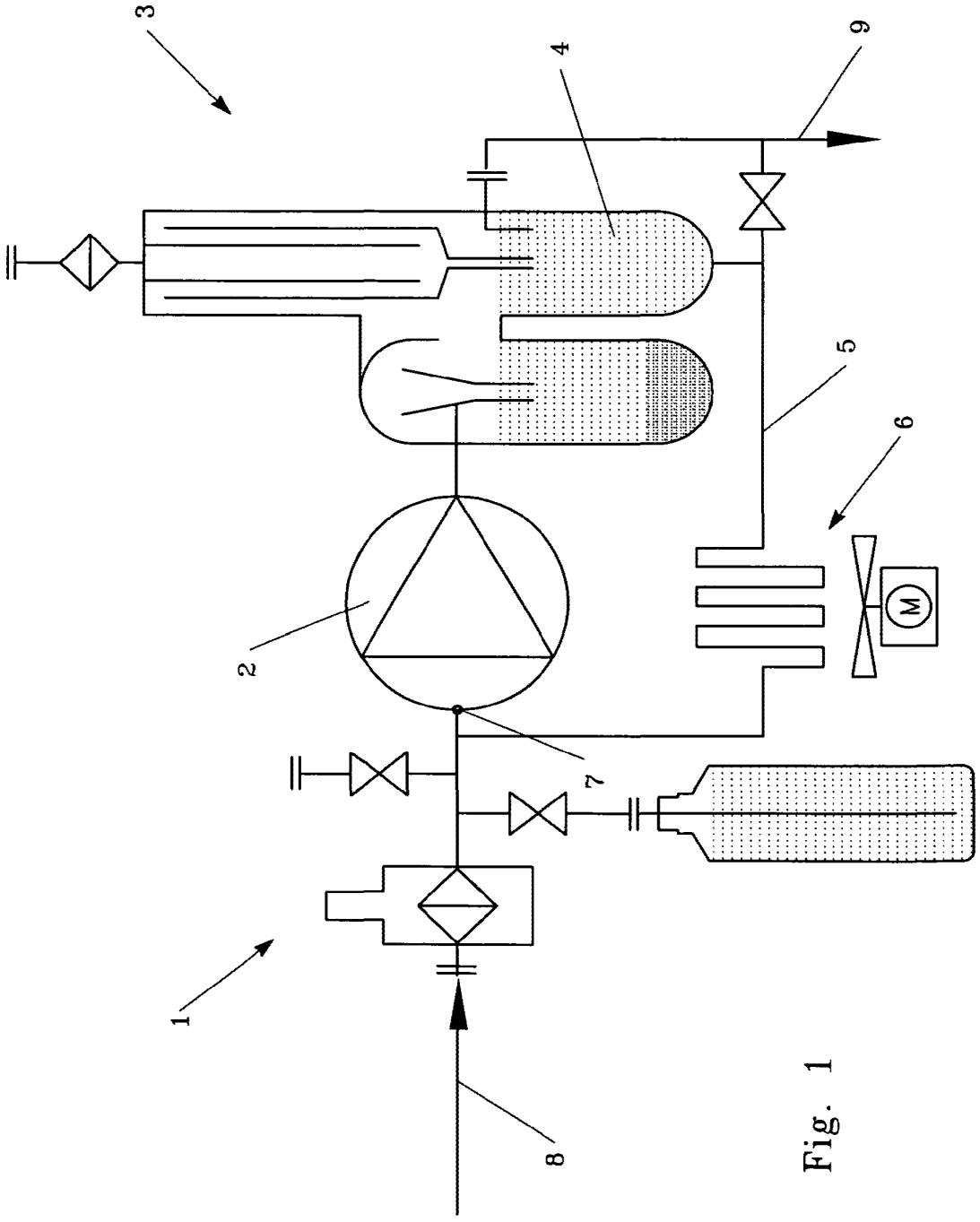
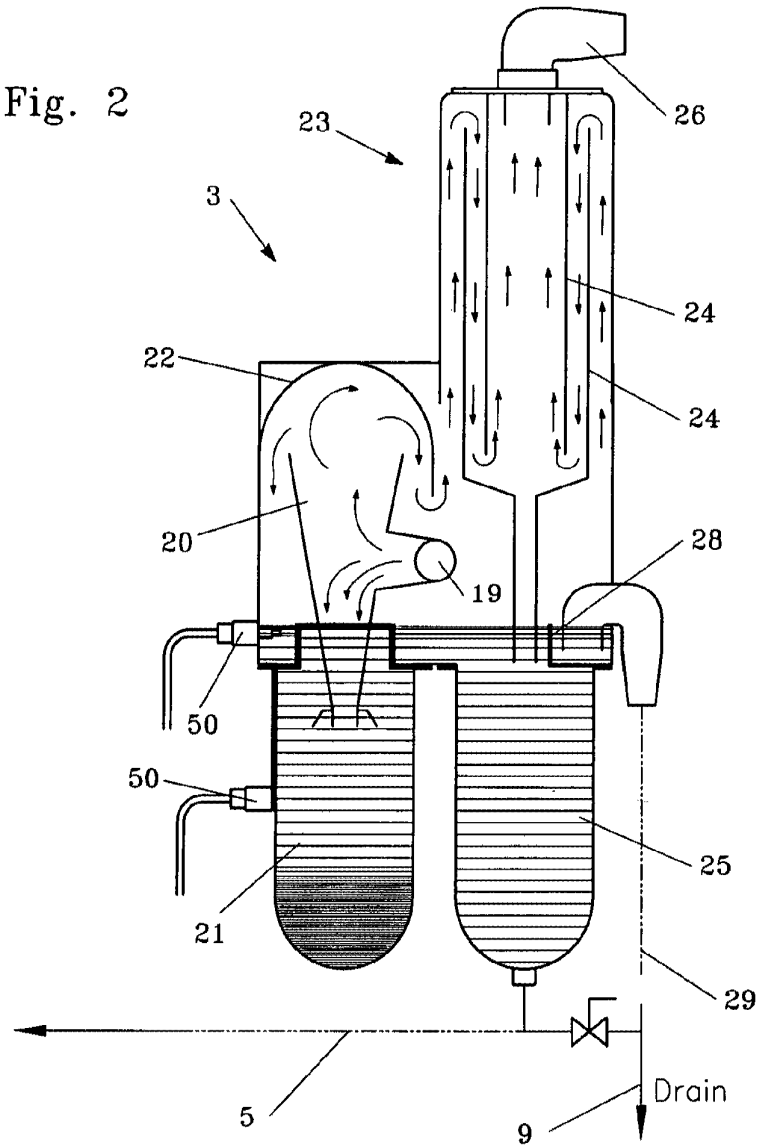


Fig. 1

PGR2023-00055 - Ex. 1002
Page 268 of 346

Fig. 2



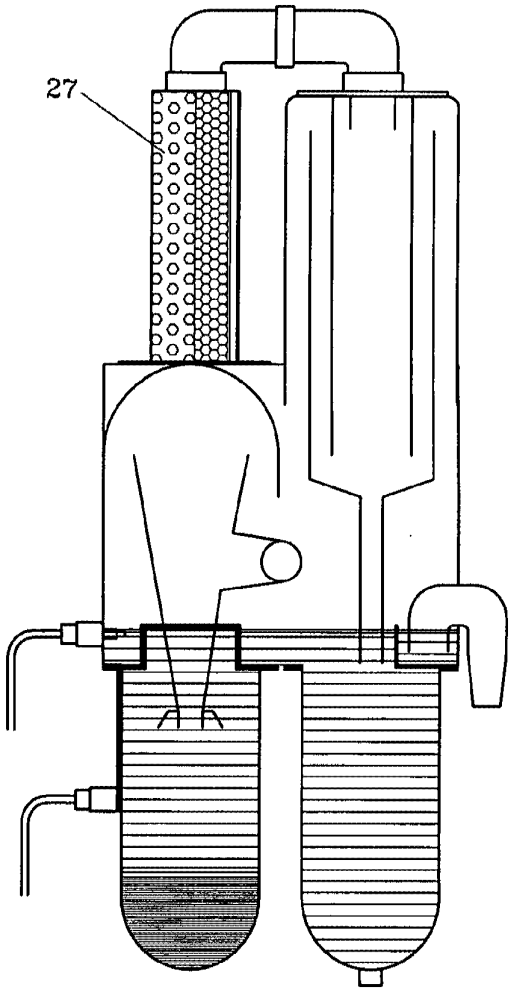


Fig. 2a

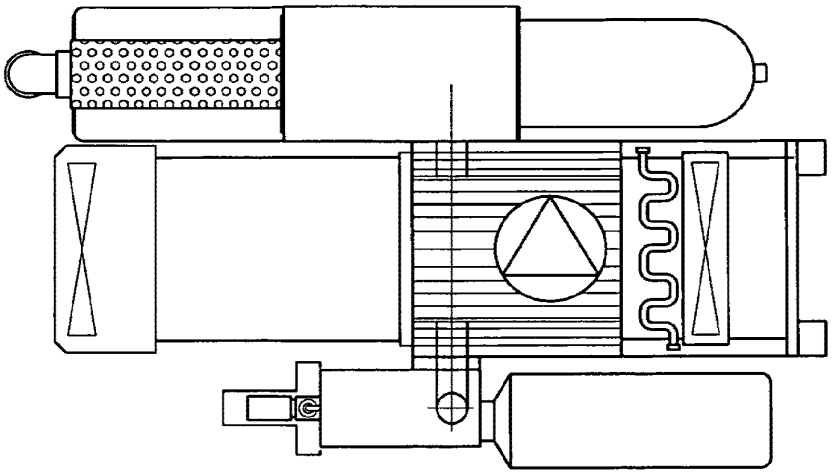


Fig. 4

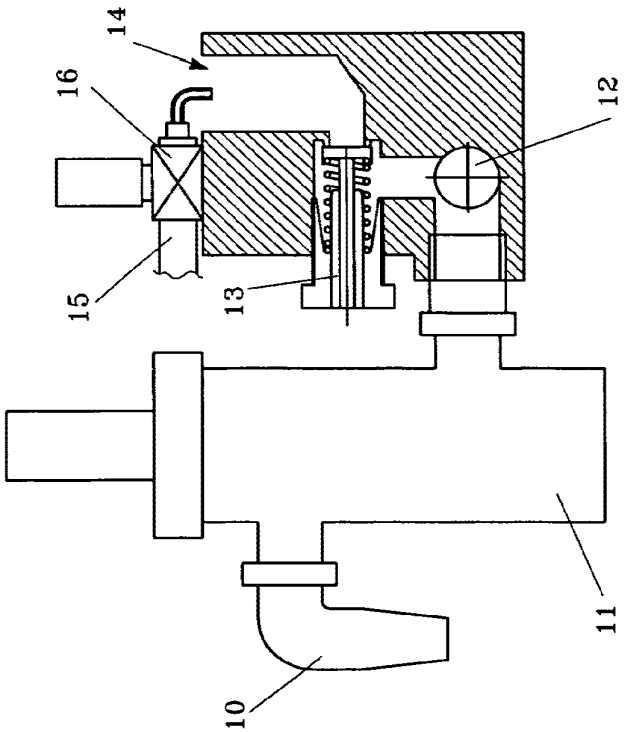


Fig. 3a

PGR2023-00055 - Ex. 1002
Page 270 of 346

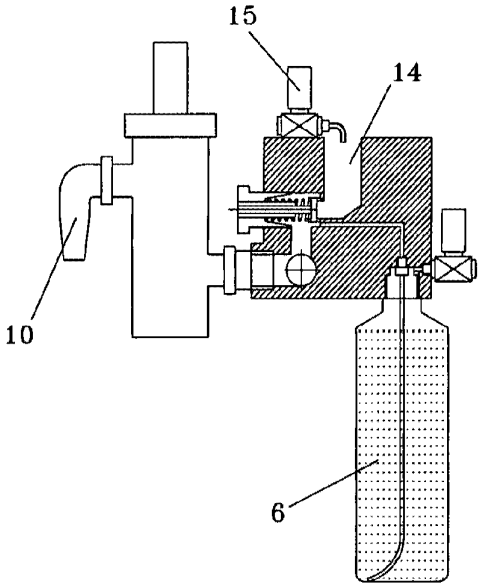


Fig. 3b

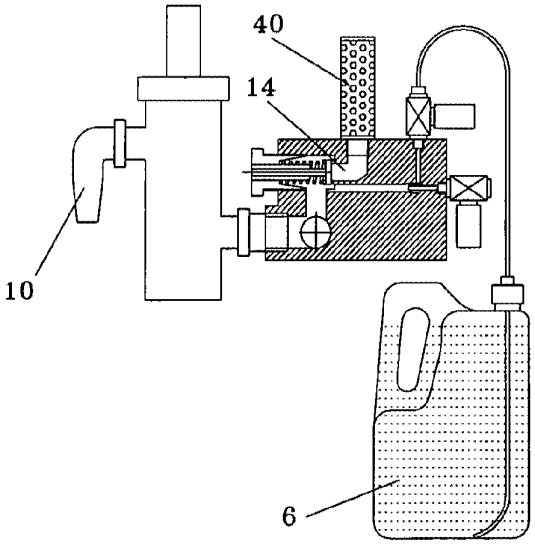


Fig. 3d

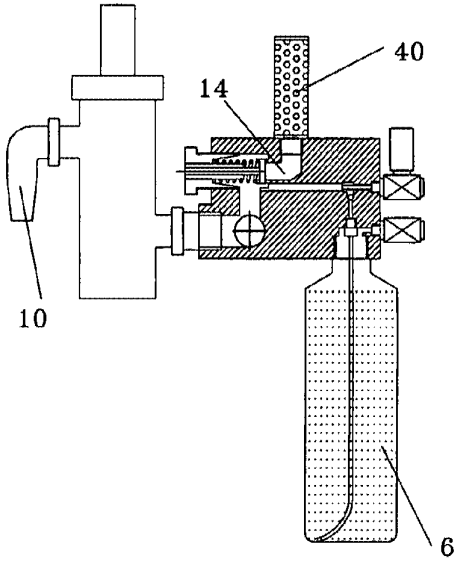


Fig. 3c

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 01 0773

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y,D	DE 31 01 954 A (JERZY) 5 August 1982 (1982-08-05) * figure 1 *	1-14	A61C17/06 A61C17/14
Y	US 5 577 910 A (HOLLAND) 26 November 1996 (1996-11-26) * column 7, line 64 - column 8, line 35 * * column 9, line 60 - column 10, line 3 * * column 10, line 37 - line 43 * * claim 5; figures 1,2 *	1-14	
Y	DE 43 28 990 A (ANWEILER ET AL.) 16 February 1995 (1995-02-16) * column 2, line 31 - line 37; figure *	3	
Y	AT 401 228 B (TRAWÖGER ET AL.) 25 July 1996 (1996-07-25) * the whole document *	6	
A	EP 0 355 467 A (SIEMENS) 28 February 1990 (1990-02-28) * column 3, line 34 - line 47 *	1,2	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A61C
A	US 3 964 112 A (PLOWMAN) 22 June 1976 (1976-06-22) * column 2, line 18 - line 65 * * figure 1 *	1	
A	WO 01 72395 A (ADA TECHNOLOGIES) 4 October 2001 (2001-10-04) * figures 5B,,7,8,11 *	2	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 September 2003	Raybould, B

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

PGR2023-00055 - Ex. 1002
Page 272 of 346

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 01 0773

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-09-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3101954 A	05-08-1982	DE 3101954 A1	05-08-1982
US 5577910 A	26-11-1996	US 5667382 A	16-09-1997
DE 4328990 A	16-02-1995	DE 4328990 A1	16-02-1995
AT 401228 B	25-07-1996	AT 23795 A	15-12-1995
EP 0355467 A	28-02-1990	DE 8816512 U1	28-09-1989
		DE 58900622 D1	06-02-1992
		EP 0355467 A1	28-02-1990
US 3964112 A	22-06-1976	NONE	
WO 0172395 A	04-10-2001	AU 3807701 A	08-10-2001
		CA 2403967 A1	04-10-2001
		WO 0172395 A1	04-10-2001
		US 2001047956 A1	06-12-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

PGR2023-00055 - Ex. 1002
Page 273 of 346

CORRECTED VERSION * C3 PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 3 :
A61C 17/04; B01D 35/02
G03C 11/24

A1

(11) International Publication Number: WO 83/ 02720

(43) International Publication Date: 18 August 1983 (18.08.83)

(21) International Application Number: PCT/DK83/00011

(22) International Filing Date: 31 January 1983 (31.01.83)

(31) Priority Application Number: 505/82

(32) Priority Date: 5 February 1982 (05.02.82)

(33) Priority Country: DK

(71)(72) Applicant and Inventor : HORN-LASSEN, Hans [DK/DK]; 12D, Klampenborgvej, DK-2930 Klampenborg (DK).

(72) Inventor: BUCHHORN, Aksel, Johan; 2A Laerkevej, DK-4300 Holbaek (DK).

(74) Agent: BUDDE, SCHOU & CO.; 4, H.C. Andersens Boulevard, DK-1553 Copenhagen V (DK).

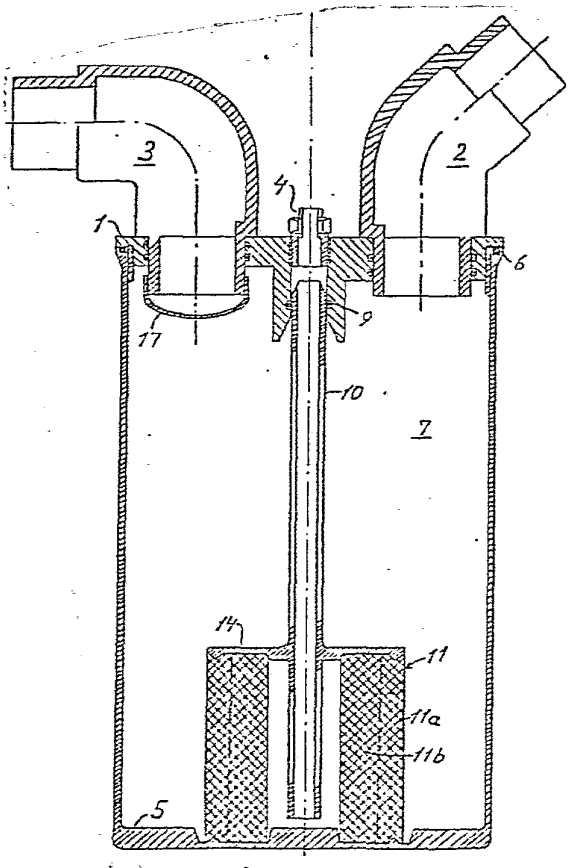
(81) Designated States: AT, BE (European patent), CH, DE, DE (Auxiliary utility model), FI, FR (European patent), GB, LU, NL, NO, SE.

Published
With international search report.

(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.



* (Referred to in PCT Gazette No. 24/1983, Section II)

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**LI**	Liechtenstein
AU	Australia	**LK**	Sri Lanka
BE	Belgium	**LU**	Luxembourg
BR	Brazil	**MC**	Monaco
CF	Central African Republic	**MG**	Madagascar
CG	Congo	**MR**	Mauritania
CH	Switzerland	**MW**	Malawi
CM	Cameroon	**NL**	Netherlands
DE	Germany, Federal Republic of	**NO**	Norway
DK	Denmark	**RO**	Romania
FI	Finland	**SE**	Sweden
FR	France	**SN**	Senegal
GA	Gabon	**SU**	Soviet Union
GB	United Kingdom	**TD**	Chad
HU	Hungary	**TG**	Togo
JP	Japan	**US**	United States of America
KP	Democratic People's Republic of Korea		

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

BUREAU OMPI WIPO INTERNATIONAL

PGR2023-00035 Ex. 1002

Page 276 of 346

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

BUREAU OMPI WIPO INTERNATIONAL

PGR2023-00053 EX 1002
Page 277 of 346

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-

BUREAU INTERNATIONAL WIPO

PGR2023-00055 - EMPI 1002

Page 278 of 346

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

BUREAU OMPI WIPO INTERNATIONAL

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

BUREAU OMPI INTERNATIONAL

PGR2023-00055 - Ex 1002
Page 280 of 346

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

BUREAU OMPI INTERNATIONAL

PGR2023-00055 - Ex 1002
Page 28 of 346

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.

BUREAU OMPI INTERNATIONAL

PGR2023-00035 - Ex. 1002
Page 282 of 346

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.

BUREAU OMPI WIPO INTERNATIONAL

PGR2023-00035 Ex. 1002
Page 283 of 346

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).

BUREAU OMPI WIPO INTERNATIONAL

PGR2023-00055, Ex. 1002
Page 284 of 346

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).

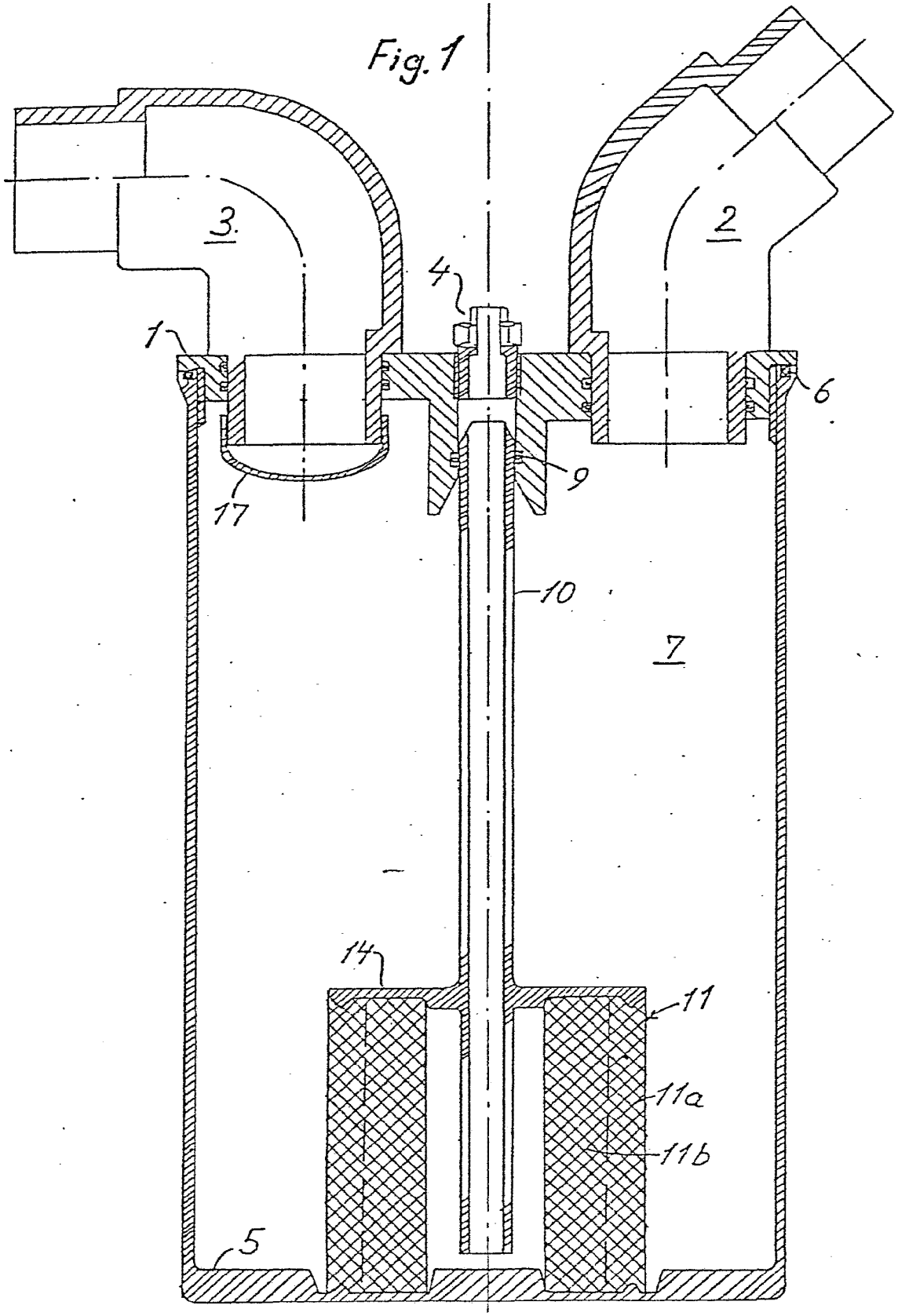
10. An apparatus as claimed in each of the preceding claims, c h a r a c t e r i z e d in that the tank (7) forms an interchangeable disposable tank which immediately under the head (1) has a cover (9) with openings flush with the openings in the connections (2, 3, 4) of the head and that the discharge 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).

BUREAU OMPI WIPO INTERNATIONAL

PGR2023-00055 Ex 1002

Page 285 of 346

Fig. 1



BUREAU OMPI INTERNATIONAL

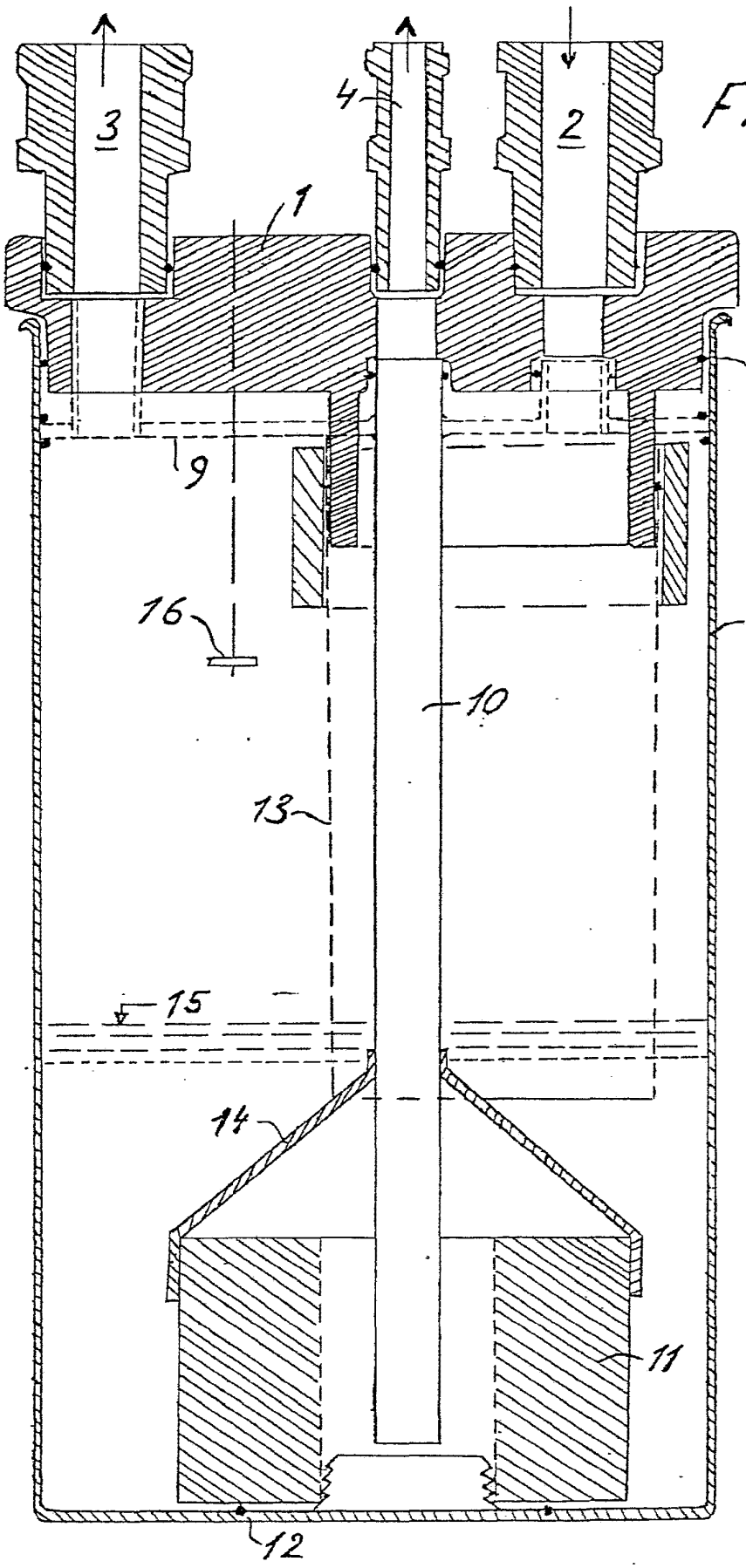


Fig. 2

BUREAU OMPI INTERNATIONAL

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 [4]

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	
Y	US, A , 2 997 180 (LOVEDAY) 22 August 1961	
A	SE, B , 333 249 (EASTMAN KODAK COMPANY) 1 July 1968	

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"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

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
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)

C4

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

(71)(72) Anmelder und Erfinder: TRAWÖGER, Werner [AT/AT]; Huebe 26, A-6173 Oberperfuss (AT). PREGENZER, Bruno [AT/AT]; Huebe 30, A-6173 Oberperfuss (AT).

(74) Anwälte: TORGGLER, Paul usw.; Wilhelm-Greilstrasse 16, A-6020 Innsbruck (AT).

(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

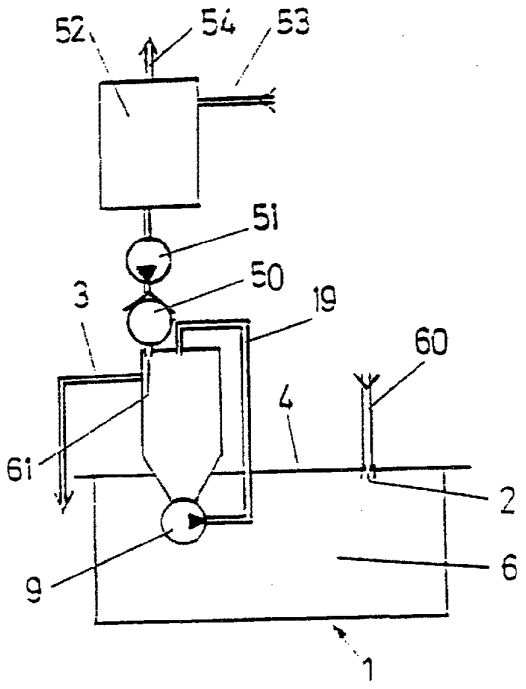
(54) Bezeichnung: ZAHNÄRZTLICHER ABSCHEIDER

(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.



LEDIGLICH ZUR INFORMATION

Codes zur Identifizierung von PCT-Vertragsstaaten auf den Kopfbögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

AT	Österreich	**GA**	Gabon	**MR**	Mauretanien
AU	Australien	**GB**	Vereinigtes Königreich	**MW**	Malawi
BB	Barbados	**GE**	Georgien	**NE**	Niger
BE	Belgien	**GN**	Guinea	**NL**	Niederlande
BF	Burkina Faso	**GR**	Griechenland	**NO**	Norwegen
BG	Bulgarien	**HU**	Ungarn	**NZ**	Neuseeland
BJ	Benin	**IE**	Irland	**PL**	Polen
BR	Brasilien	**IT**	Italien	**PT**	Portugal
BY	Belarus	**JP**	Japan	**RO**	Rumänien
CA	Kanada	**KE**	Kenya	**RU**	Russische Föderation
CF	Zentrale Afrikanische Republik	**KG**	Kirgisistan	**SD**	Sudan
CG	Kongo	**KP**	Demokratische Volksrepublik Korea	**SE**	Schweden
CH	Schweiz	**KR**	Republik Korea	**SI**	Slowenien
CI	Côte d'Ivoire	**KZ**	Kasachstan	**SK**	Slowakei
CM	Kamerun	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Tschad
CS	Tschechoslowakei	**LU**	Luxemburg	**TG**	Togo
CZ	Tschechische Republik	**LV**	Lettland	**TJ**	Tadschikistan
DE	Deutschland	**MC**	Monaco	**TT**	Trinidad und Tobago
DK	Dänemark	**MD**	Republik Moldau	**UA**	Ukraine
ES	Spanien	**MG**	Madagaskar	**US**	Vereinigte Staaten von Amerika
FI	Finnland	**ML**	Mali	**UZ**	Usbekistan
FR	Frankreich	**MN**	Mongolei	**VN**	Vietnam

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

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-

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-

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.

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

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.

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.

Fig. 1

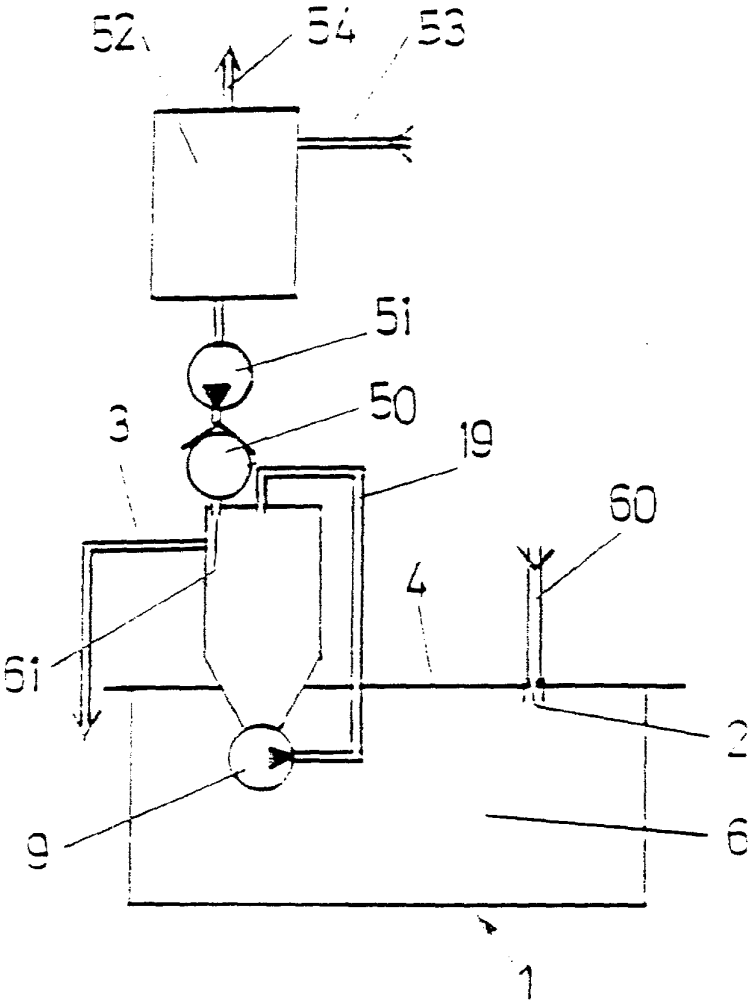
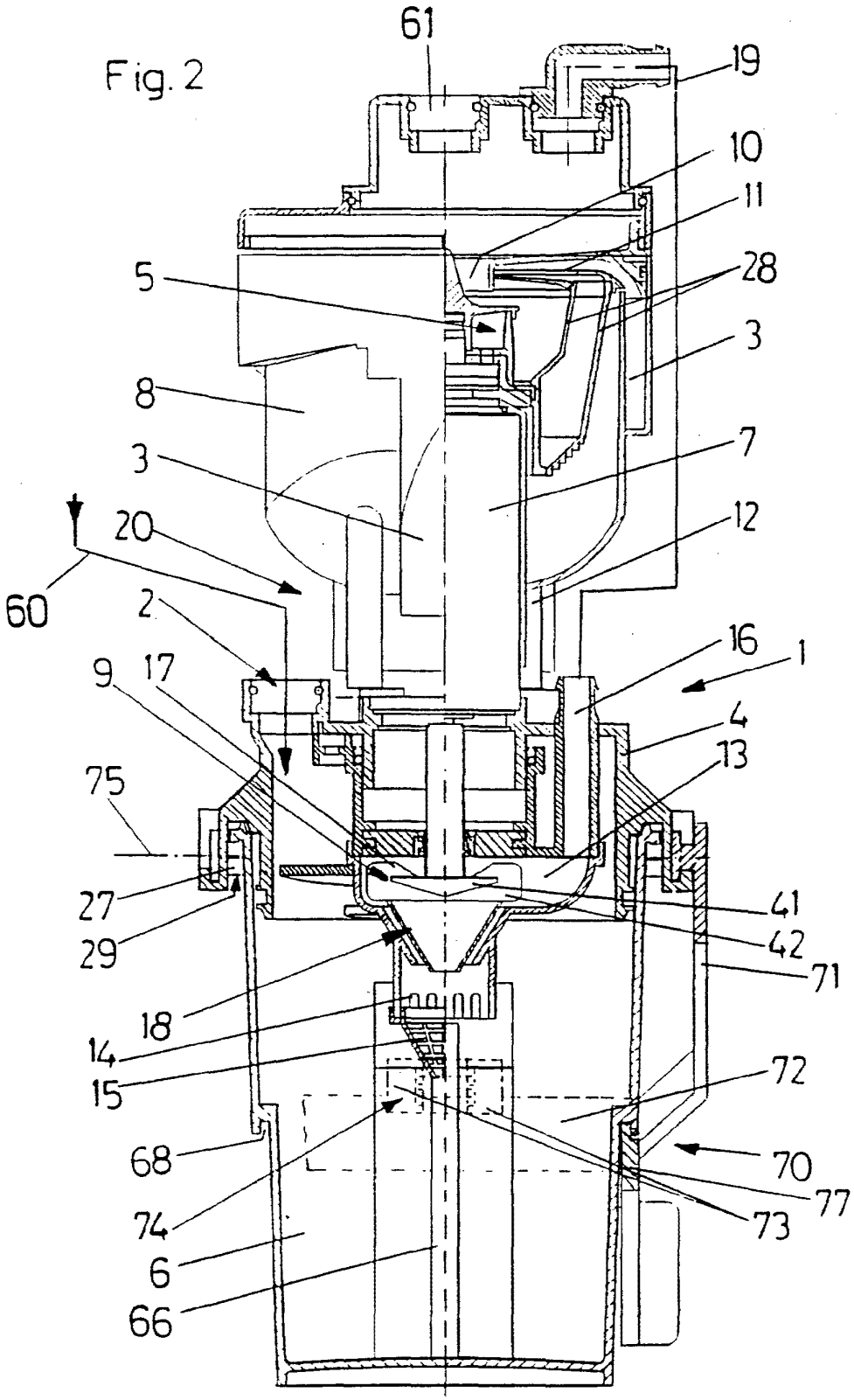


Fig. 2


61
19
10
11
28
5
3
8
7
3
12
20
60
2
16
1
9
17
4
13
75
41
27
42
29
71
18
14
72
15
70
68
77
74
73
6
66

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.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

2

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

Form PCT/ISA/210 (second sheet) (July 1992)

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
EP-A-0432142	12-06-91	WO-A-	8603669	03-07-86
		AU-A-	5311886	22-07-86
		CA-A-	1293455	24-12-91
		DE-A-	3584636	12-12-91
		DE-U-	8536837	10-12-87
		DE-U-	8590187	10-12-87
		EP-A,B	0242358	28-10-87
		EP-A-	0433270	19-06-91
		EP-A-	0441410	14-08-91
		US-A-	5018971	28-05-91
WO-A-9218062	29-10-92	AT-B-	395941	26-04-93
		CA-A-	2107901	13-10-92
		EP-A-	0579705	26-01-94
EP-A-0400431	05-12-90	DE-A-	3916742	06-12-90
		DE-D-	59002975	11-11-93
		ES-T-	2045639	16-01-94
EP-A-0300439	25-01-89	DE-A-	3724247	02-02-89
		DE-D-	3885524	16-12-93

INTERNATIONALER RECHERCHENBERICHT

Intern ales Aktenzeichen
PCT/AT 93/00199

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
IPK 5 A61C17/06

Nach der Internationalen Patentklassifikation (IPK) oder nach der nationalen Klassifikation und der IPK

B. RECHERCHIERTE GEBIETE

Recherchierter Mindestprüfstoff (Klassifikationssystem und Klassifikationssymbole)
IPK 5 A61C

Recherchierte aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

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

☒ Siehe Anhang Patentfamilie

° Besondere Kategorien von angegebenen Veröffentlichungen :
"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist
"E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist
"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)
"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht
"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist
"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zumVerständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist
"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann allein aufgrund dieser Veröffentlichung nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden
"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist
"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

Datum des Abschlusses der internationalen Recherche	Absendedatum des internationalen Recherchenberichts
14. April 1994	22.04.94

Name und Postanschrift der Internationale Recherchenbehörde	Bevollmächtigter Bediensteter
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

Formblatt PCT/ISA/210 (Blatt 2) (Juli 1992)

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
EP-A-0432142	12-06-91	WO-A-	8603669	03-07-86
		AU-A-	5311886	22-07-86
		CA-A-	1293455	24-12-91
		DE-A-	3584636	12-12-91
		DE-U-	8536837	10-12-87
		DE-U-	8590187	10-12-87
		EP-A,B	0242358	28-10-87
		EP-A-	0433270	19-06-91
		EP-A-	0441410	14-08-91
		US-A-	5018971	28-05-91
WO-A-9218062	29-10-92	AT-B-	395941	26-04-93
		CA-A-	2107901	13-10-92
		EP-A-	0579705	26-01-94
EP-A-0400431	05-12-90	DE-A-	3916742	06-12-90
		DE-D-	59002975	11-11-93
		ES-T-	2045639	16-01-94
EP-A-0300439	25-01-89	DE-A-	3724247	02-02-89
		DE-D-	3885524	16-12-93

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 January 2018 (11.01.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/006106 A1

(51) International Patent Classification:
A61C 17/06 (2006.01)

(21) International Application Number:
PCT/AM2017/000003

(22) International Filing Date:
29 May 2017 (29.05.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
AM20160061 07 July 2016 (07.07.2016) AM

(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

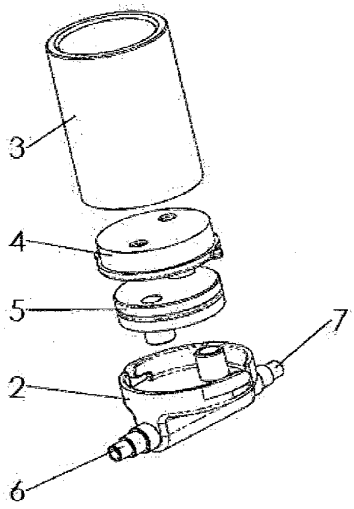


Fig.2

(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.

WO 2018/006106 A1

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

PGR2023-00055 - Ex. 1002
Page 305 of 346

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).

PGR2023-00055 - Ex. 1002
Page 306 of 346

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

PGR2023-00055 - Ex. 1002
Page 307 of 346

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.

PGR2023-00055 - Ex. 1002
Page 308 of 346

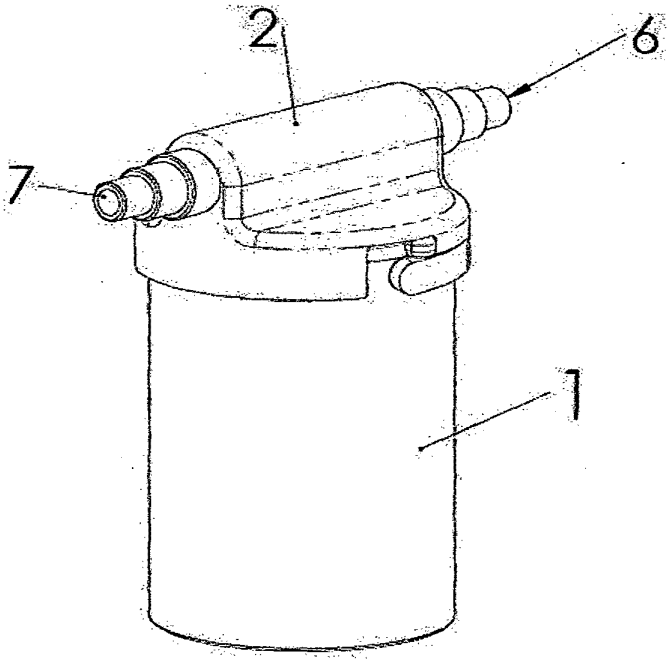


Fig.1

PGR2023-00055 - Ex. 1002
Page 309 of 346

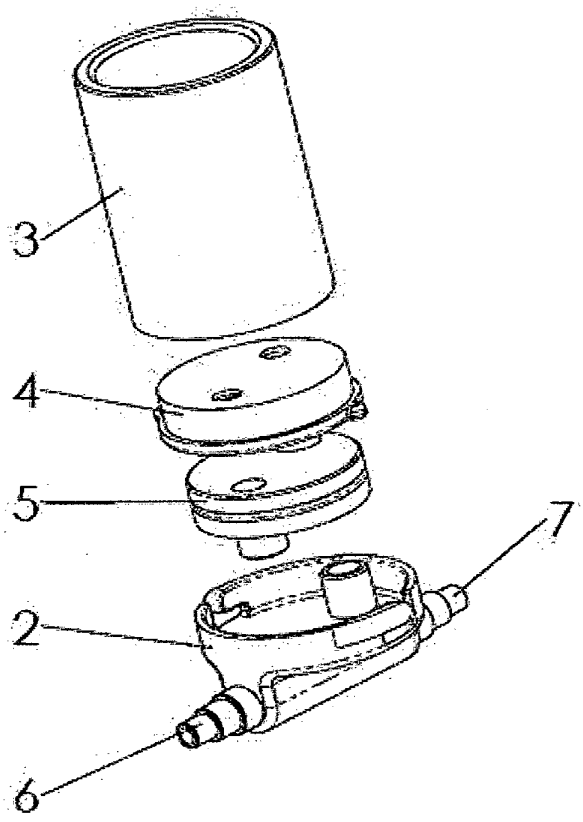


Fig.2

PGR2023-00055 - Ex. 1002
Page 310 of 346

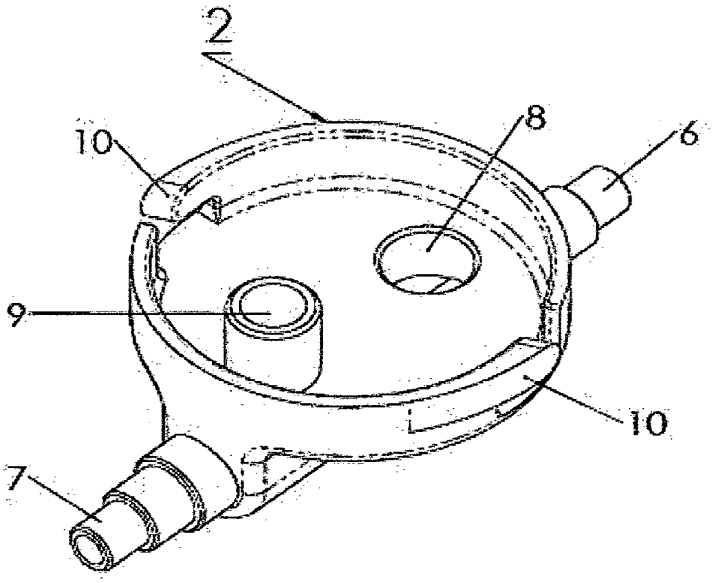


Fig.3

PGR2023-00055 - Ex. 1002
Page 311 of 346

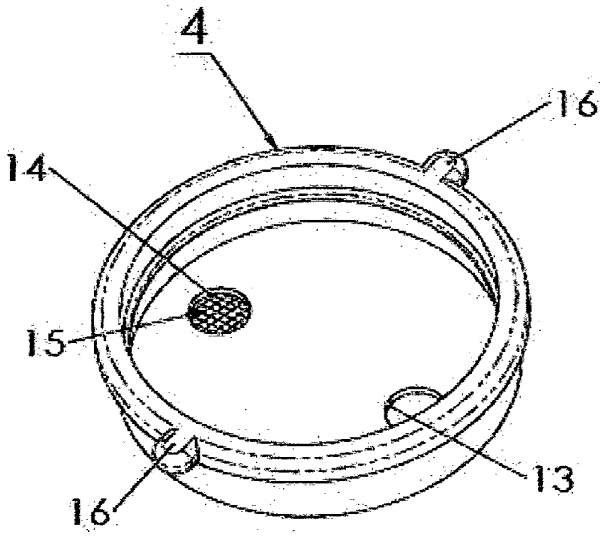


Fig.4

PGR2023-00055 - Ex. 1002
Page 312 of 346

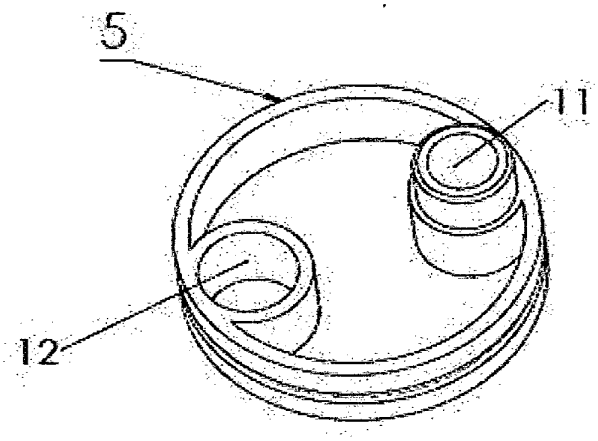


Fig.5

PGR2023-00055 - Ex. 1002
Page 313 of 346

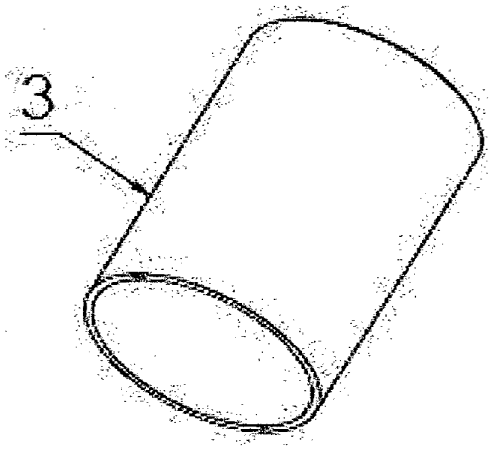


Fig.6

PGR2023-00055 - Ex. 1002
Page 314 of 346

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)

PGR2023-00055 - Ex. 1002
Page 315 of 346

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

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.

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,

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.

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
US 4700412 A	20-10-1987	NONE	
US 5336406 A	09-08-1994	US 5336406 A	09-08-1994
		US 5456830 A	10-10-1995
		US 5486288 A	23-01-1996
US 3777403 A	11-12-1973	NONE	
WO 8302720 A1	18-08-1983	AT 388906 B	25-09-1989
		CH 664702 A5	31-03-1988
		DE 3332122 C2	07-01-1993
		DE 3332122 T	12-07-1984
		DK 50582 A	06-08-1983
		EP 0100327 A1	15-02-1984
		FI 832974 A	19-08-1983
		GB 2124923 A	29-02-1984
		NL 8320015 A	01-11-1983
		WO 8302720 A1	18-08-1983
KR 101300050 B1	29-08-2013	NONE	

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Detachable Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Filer:	Steven R. Lazar
Attorney Docket Number:	SMTX-001-T2-US

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2100	2100
Pages:				
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70

Petition:	
Patent-Appeals-and-Interference:	
Post-Allowance-and-Post-Issuance:	
Extension-of-Time:	
Miscellaneous:	
Total in USD ($)	**3000**

Electronic Acknowledgement Receipt

EFS ID:	46815630
Application Number:	17965556
International Application Number:	
Confirmation Number:	8686
Title of Invention:	Detachable Container
First Named Inventor/Applicant Name:	Nicholas Mozzicato
Customer Number:	80709
Filer:	Steven R. Lazar
Filer Authorized By:	
Attorney Docket Number:	SMTX-001-T2-US
Receipt Date:	13-OCT-2022
Filing Date:	
Time Stamp:	17:36:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$3000
RAM confirmation Number	E20220CH37220709
Deposit Account	
Authorized User	

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Track One Request	01-SMTX-01-T2-aia0424.pdf	106077 c184e3ff65904987e0187b6193ed50a96a196101	no	2
Warnings:					
Information:					
2	Application Data Sheet	02-SMTX-001-T2-ADS-10-13-2022.pdf	1824006 91da72fa6fb56c4cb3b118b1a7590407570f61a6	no	10
Warnings:					
Information:					
3		03-SMTX-001-T2-SPECIFICATION.pdf	3626616 9193e13aaf60be5624c2b167128b0e440a7c5123	yes	16

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	13
Claims	14	15
Abstract	16	16

Warnings:					
Information:					
4	Drawings-only black and white line drawings	04-SMTX-001-T2-Drawings.pdf	1278792 5c08d3226e75a39804fc48b98040f9147d37b5d0	no	26
Warnings:					
Information:					
5	Preliminary Amendment	05-SMTX-001-T2-Preliminary_Amendment.pdf	323683 c837bc37490329bcbc464690a12bb4f390c35207	no	11

Warnings:					
Information:					
6	Oath or Declaration filed	06-Mozzicato_declaration_signed.pdf	86993 530cc0872026f098d3c2e6ca5513c127273b0d1d	no	1
Warnings:					
Information:					
7	Oath or Declaration filed	07-Schofield_declaration_signed.pdf	163580 6a486c548f63c916a9e80fd0e693d3955302abe2	no	2
Warnings:					
Information:					
8	Oath or Declaration filed	08-Goulston_declaration_signed.pdf	130611 6e567e1d4eea0d9f42fc2565b9e0d9ece01b9d92	no	1
Warnings:					
Information:					
9	Oath or Declaration filed	09-Toole_declaration_signed.pdf	177141 fb996b1c5a21f0d2dd257830a1605b39d9064540	no	2
Warnings:					
Information:					
10	Transmittal Letter	01-SMTX-001-T2_First_IDS_Transmittal_Letter.pdf	68959 42f28f3530644284485a0a4773f403ddf4902ed9	no	2
Warnings:					
Information:					
11	Information Disclosure Statement (IDS) Form (SB08)	02-SMTX-01-T2_IDS_List_of_References.pdf	164086 33d13e9b76f39793c2b18e6d429e79b4166de408	no	5
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
12	Foreign Reference	C1_CA2442513A1.pdf	527650 2d1336fc77b9e4fbe5fcc3e684b754459a42a7f5	no	13
Warnings:					

Information:					
13	Foreign Reference	C2_EP1366728A1.pdf	242722 9fc1a6f6991c58d30c5cea933cc887b52a363b66	no	11
Warnings:					
Information:					
14	Foreign Reference	C3_WO1983002720A1.pdf	802369 6385573ff764fc04629bfd804c092b22faf82fa8	no	15
Warnings:					
Information:					
15	Foreign Reference	C4_WO1994016643A1.pdf	670795 d2c07d2444b23682989b2d7621019cb6dc96922c	no	15
Warnings:					
Information:					
16	Foreign Reference	C5_WO2018006106A1.pdf	537654 8f4c00c156a8485724c49f049fe7fe9061117a61	no	17
Warnings:					
Information:					
17	Non Patent Literature	D3_ASME_B17-1_1967_R2013.pdf	1293275 dba367469cccafd250200bdd4d24e773a3f239a5	no	18
Warnings:					
Information:					
18	Non Patent Literature	D1_ISO11143-2008_std.pdf	1361758 5f45b78a5a779ee5974b4161d3d09de8c8b4cc42	no	32
Warnings:					
Information:					
19	Non Patent Literature	D2_SMTX-Hg5_op_manual_2012.pdf	2437262 4a40f47d310af9c689617c1d154e24a7c2e828c4	no	7
Warnings:					
Information:					

20	Fee Worksheet (SB06)	fee-info.pdf	50604 594fb37faf58fb492231d37fbeb80ecfcdf802d2	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	15874633

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/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	Detachable Container

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 16033823

filed on July 12, 2018

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: Nick Mozzicato Date (Optional): 8-13-18

Signature: [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.

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	Detachable Container

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 16033823 filed on July 12, 2018

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: Robin Schofield Date (Optional): 07/27/2018

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.

Privacy Act Statement

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

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

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

PTO/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	Detachable Container

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 16033823

filed on July 12, 2018.

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: Richard Goulston Date (Optional): _____

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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/01 (05-12)
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	Detachable Container

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 16033823

filed on July 12, 2018

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): 8/15/18

Signature: [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.

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Solmetex LLC

Continuation of Application No.: 16/941,522

Filed: July 28, 2020

Docket No.: SMTX-01-T2-US

Confirmation No.: TBA

Art Unit: OPAP

Examiner: Central, Docket

Title: DETACHABLE RECYCLING CONTAINER

FIRST INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97 and 1.98

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

Dear Commissioner:

In compliance with the duty of disclosure under 37 C.F.R. § 1.56, it is respectfully requested that this Information Disclosure Statement be entered and the references listed on the attached List of References be considered by the Examiner and made of record.

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), copies of the U.S. Patents and/or U.S. Patent Application Publications on the attached List of References are not being submitted.

Applicant would like to make the Examiner aware of the following applications to which this application claims priority: This application is a continuation-in-part of U.S. Patent Application No. 16/033,823, filed July 12, 2018, now issued as U.S. Patent No. 10,779,923, which is a continuation-in-part of U.S. Patent Application No. 15/730,828, filed October 12, 2017, now issued as U.S. Patent No. 10,646,313, which claims the benefit of and priority to U.S. Provisional Patent Application No. 62/414,712, filed October 29, 2016; and U.S. Provisional Patent Application No. 62/406,990, filed October 12, 2016.

This application also claims the benefit of and the priority to the following Design Patents: This application further claims priority to U.S. Patent Application No. 29/667,212, filed October 19, 2018, which is a continuation of U.S. Patent Application No. 29/585,659, filed November 28, 2016, now issued as U.S. Patent No. D835,778. This application further claims priority to U.S. Patent Application No. 29/585,674, filed November 28, 2016, now issued as U.S. Patent No. D840,534. This application further

claims priority to U.S. Patent Application No. 29/672,887, filed December 10, 2018, which is a continuation of U.S. Patent Application No. 29/585,668, filed November 28, 2016, now issued as U.S. Patent No. D835,779. This application further claims priority to U.S. Patent Application No. 29/577,701, filed September 14, 2016, now issued as U.S. Patent No D848,612. This application further claims priority to U.S. Patent Application No. 29/567,544, filed June 9, 2016, now issued as U.S. Patent No. D840,533. This application further claims priority to U.S. Patent Application No. 29/671,943, filed November 30, 2018, which is a continuation of U.S. Patent Application No. 29/565,622, filed May 23, 2016, now issued as U.S. Patent No. D835,264.

Pursuant to 37 C.F.R. § 1.98(d) and M.P.E.P. § 609.02, copies of foreign patent documents and other documents that were previously cited and submitted in one or more of the parent application(s) in accordance with 37 C.F.R § 1.98(a)-(c) need not be resubmitted in this application. It is the Applicant's belief that all such references on the attached List of References were previously cited and submitted in an Information Disclosure Statement in accordance with 37 C.F.R § 1.98(a)-(c) in one or more of the above referenced U.S. Patent Applications to which this application claims priority under 35 U.S.C. § 120.

In accordance with 37 C.F.R. §§ 1.97(g) and (h), this Information Disclosure Statement is not to be construed as a representation that a search has been made, and is not to be construed to be an admission that the information disclosed is, or is considered to be, prior art with respect to the present application or material to patentability as defined in 37 C.F.R. § 1.56.

This Information Disclosure Statement is being filed prior to the receipt of a first office action on the merits. Accordingly, pursuant to 37 C.F.R. § 1.97(b)(3), no fees are believed to be due in connection with the filing of this Information Disclosure Statement. However, should any fees be deemed necessary (except payment of the issue fee), the Director is urged to contact the below-signed representative of the Applicant.

Respectfully submitted,

Date: October 13, 2022

By: /Steven R. Lazar/
Steven R. Lazar
Attorney for Applicant
Registration No. 32,618
617-966-2374

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: *Not Yet Assigned*
MOZZICATTO	)	
	:	Group Art Unit: *Not Yet Assigned*
Application No.: *Not Yet Assigned* *Continuation Application of Ser. No. 16/941,522*	)	
	:	Confirmation No.: *Not Yet Assigned*
Filed: July 12, 2018	)	
	:	
For: DETACHABLE CONTAINER	)	
	:	

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

PRELIMINARY AMENDMENT

Dear Commissioner:

The Applicant respectfully requests that this Preliminary Amendment be entered prior to the examination of the above-captioned patent application.

The Applicant's **Amendments to the Specification** is presented on page 2 of this paper.

The Applicant's **Listing of Claims** is presented on page 3 of this paper.

The Applicant's **Remarks** begin on page 9 of this paper.

AMENDMENT TO SPECIFICATION:

Please replace the paragraph in the "Related Application" section with the following paragraph:

-- **RELATED APPLICATIONS**

This application is a continuation of U.S. Application No. 16/941,522, filed July 28, 2020, which is a continuation-in-part of U.S. Application No. 16/033,823, filed July 12, 2018, now issued as U.S. Patent No. 10,779,923, which is a continuation-in-part of U.S. Application No. 15/730,828, filed October 12, 2017, now issued as U.S. Patent No. 10,646,313, which claims the benefit of and priority to provisional patent application Ser. No. 62/414,712, filed on October 29, 2016, presently expired; and provisional patent application Ser. No. 62/406,990, filed on October 12, 2016, presently expired. This patent application further claims priority from patent application Ser. No. 29/585,674, filed on Nov. 28, 2016, now issued as U.S. Patent No. D840,534. This patent application further claims priority from patent application Ser. No. 29/585,668, filed on Nov. 28, 2016, now issued as U.S. Patent No. D835,779. This application further claims priority to patent application Ser. No. 29/585,659, filed on Nov. 28, 2016, now issued as U.S. Patent No. D835,778. This patent application further claims priority from patent application Ser. No. 29/577,701, filed on Sep. 14, 2016, now issued as U.S. Patent No. D848,612. This patent application further claims priority from patent application Ser. No. 29/567,544, filed on Jun. 9, 2016, now issued as U.S. Patent D840,533. This patent application further claims priority from patent application Ser. No. 29/565,622, filed on May 23, 2016, now issued as U.S. Patent No. D835,264. --

LISTING OF CLAIMS:

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

1-12. (Cancelled)

13. (New) A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source upstream from the system outlet for drawing fluid from the dental amalgam effluent toward the system outlet, and a pair of retaining pins for use with the detachable container, the detachable container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including radially protruding structures located below the upper generally cylindrical region, the radially protruding structures defining pin-engaging surfaces for engaging the pair of retaining pins of the dental amalgam separation system to ensure the detachable container does not become detached when there is no pressure being applied from the vacuum source, the pair of pin-engaging surfaces being located radially outward from the periphery of the circular upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the

dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor for removing fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is drawn toward the container outlet port due to the vacuum source.

14. (New) The detachable dental-amalgam container of claim 13, wherein the container inlet port and the container outlet port extend above the circular upper surface by the same height.

15. (New) The detachable dental-amalgam container of claim 13, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container.

16. (New) The detachable dental-amalgam container of claim 15, further including a cap that retains at least one of the plugs on the filled detachable dental-amalgam container.

17. (New) The detachable dental-amalgam container of claim 16, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.

18. (New) The detachable dental-amalgam container of claim 13, wherein the container top portion has a maximum outer dimension that is greater than a maximum outer diameter of the main body.

19. (New) The detachable dental-amalgam container of claim 13, wherein the container outlet port is configured for fluidic coupling to the system outlet of the dental amalgam separation system that transfers fluid from the dental amalgam to a municipal water disposal system.

20. (New) The detachable dental-amalgam container of claim 13, wherein the radially protruding structures include a flange extending in a direction away from the generally cylindrical upper region.

21. (New) The detachable dental-amalgam container of claim 21, wherein the flange extends entirely around the container top portion.

22. (New) The detachable dental-amalgam container of claim 13, wherein each of the container inlet port and the container outlet port has an external O-ring at an upper portion thereof, the O-rings configured to help to provide a seal between the detachable container and the dental amalgam separation system when a suction pressure is applied to the system outlet by the vacuum source.

23. (New) The detachable dental-amalgam container of claim 13, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the circular upper surface, the detachable container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

24. (New) The detachable dental-amalgam container of claim 23, wherein the keying feature includes a recess formed in an outermost periphery of the container top portion.

25. (New) A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source upstream from the system outlet for drawing fluid from the dental amalgam effluent through the system outlet, and a pair of retaining pins for use with the detachable container, the detachable container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body,

the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container inlet port and the container outlet port outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable container and the dental amalgam separation system while the vacuum source draws fluid from the dental amalgam effluent toward the system outlet, the container top portion further including radially protruding structures located below the upper generally cylindrical region, the radially protruding structures having lower surfaces defining pin-receiving regions for receiving the pair of retaining pins of the dental amalgam separation system to ensure the detachable container does not become detached from the dental amalgam separation system, the lower surfaces that define the pin-receiving regions are located radially outward from the periphery of the upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is drawn from the interior volume of main body into the container outlet port due to the vacuum source upstream from the system outlet.

26. (New) The detachable dental-amalgam container of claim 25, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap that retains at least one of the plugs on the filled detachable dental-amalgam container.

27. (New) The detachable dental-amalgam container of claim 26, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to

engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.

28. (New) The detachable dental-amalgam container of claim 25, wherein the radially protruding structures include a flange extending away from the generally cylindrical upper region.

29. (New) The detachable dental-amalgam container of claim 28, wherein the flange extends entirely around the container top portion.

30. (New) The detachable dental-amalgam container of claim 25, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the upper surface, the detachable container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

31. (New) A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, a system outlet, a vacuum source upstream from the system outlet for drawing fluid from the dental amalgam effluent toward the system outlet, and a pair of retaining pins for use with the detachable container, the detachable container comprising:

a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the dental amalgam separation system;

a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, the container top portion further including radially protruding structures located below the upper generally cylindrical region, the radially protruding structures having

lower surfaces defining pin-receiving regions for receiving the pair of retaining pins of the dental amalgam separation system to ensure the detachable container does not become detached from the dental amalgam separation system; and

wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and

wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is drawn from the interior volume of main body into the container outlet port due to the vacuum source upstream from the system outlet.

32. (New) The detachable dental-amalgam container of claim 31, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region, the detachable container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.

REMARKS

Claims 13-32 remain in the application for further prosecution. Claim 13-32 are presently being added. Claims 1-12 are being cancelled. No new matter is being added.

New Claims 13-32

New claims 13-32 are focused on the configuration of the top portion of the container, which has a generally cylindrical upper region having an upper surface with a periphery from which a container inlet port 15 and a container outlet port 16 extend. The container inlet port 15 and the container outlet port 16 are unaligned with the central axis of the main body, such that the container inlet port 15 is positioned nearer to a periphery of the upper surface than the container outlet port 16. Examples of the generally cylindrical upper region of the container top portion that include the container inlet and outlet ports 15, 16 that are offset from the central axis of the main body are shown, for example, in FIGS. 1, 10A, and 10B.

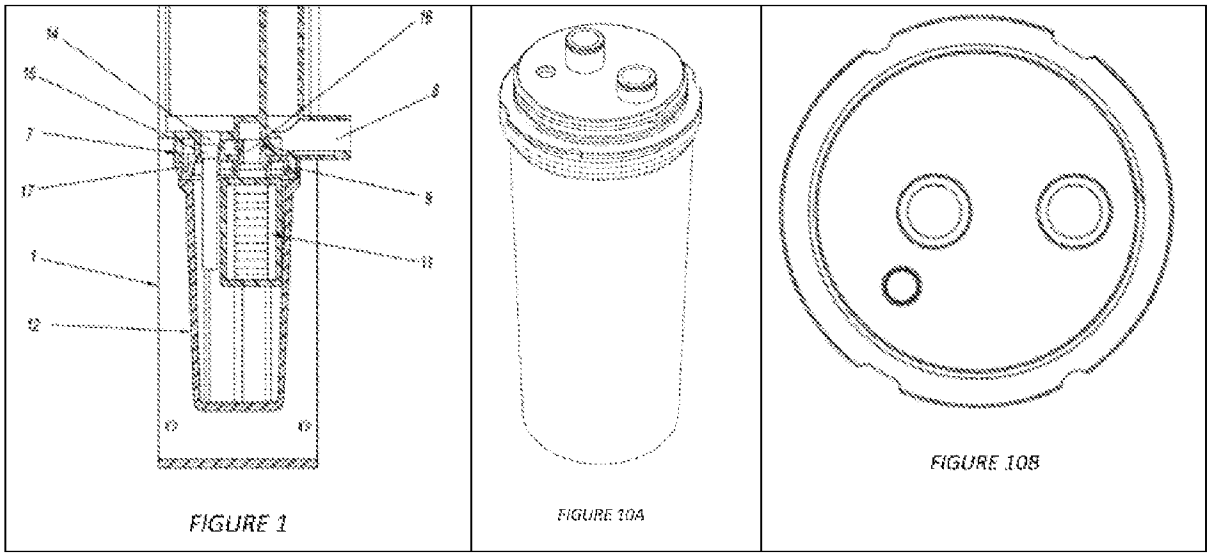


FIGURE 1

FIGURE 10A

FIGURE 10B

The new claim set also makes reference to the removable retaining pins 13, which are shown in FIG. 2. The detachable container receives the "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." See ¶0092.

FIG. 4A

Applicant has identified a potential discrepancy between FIG. 4A in the parent application (U.S. Application No. 16/941,522), and FIG. 4A from the original drawing sets of the other four priority applications – (i) U.S. Provisional Application Serial No. 62/414,712, filed on Oct. 29, 2016, (ii) U.S. Provisional Application Serial No. 62/406,990, filed on Oct. 12, 2016, (iii) U.S. Application No. 16/033,823, filed July 12, 2018, now issued as U.S. Patent No. 10,779,923, and (iv) U.S. Application No. 15/730,828, filed October 12, 2017, now issued as U.S. Patent No. 10,646,313. In those original drawing sets, a groove can be seen below the generally cylindrical upper region and radially outward from the periphery of the circular upper surface at the top of the generally cylindrical upper region. For example, the illustration below shows originally filed FIG. 4A from the grandparent application (U.S. Application No. 16/033,823) and FIG. 4A from the great-grandparent application (U.S. Application No. 15/730,828), both of which include annotations showing the groove, which is where the retaining pins are inserted.

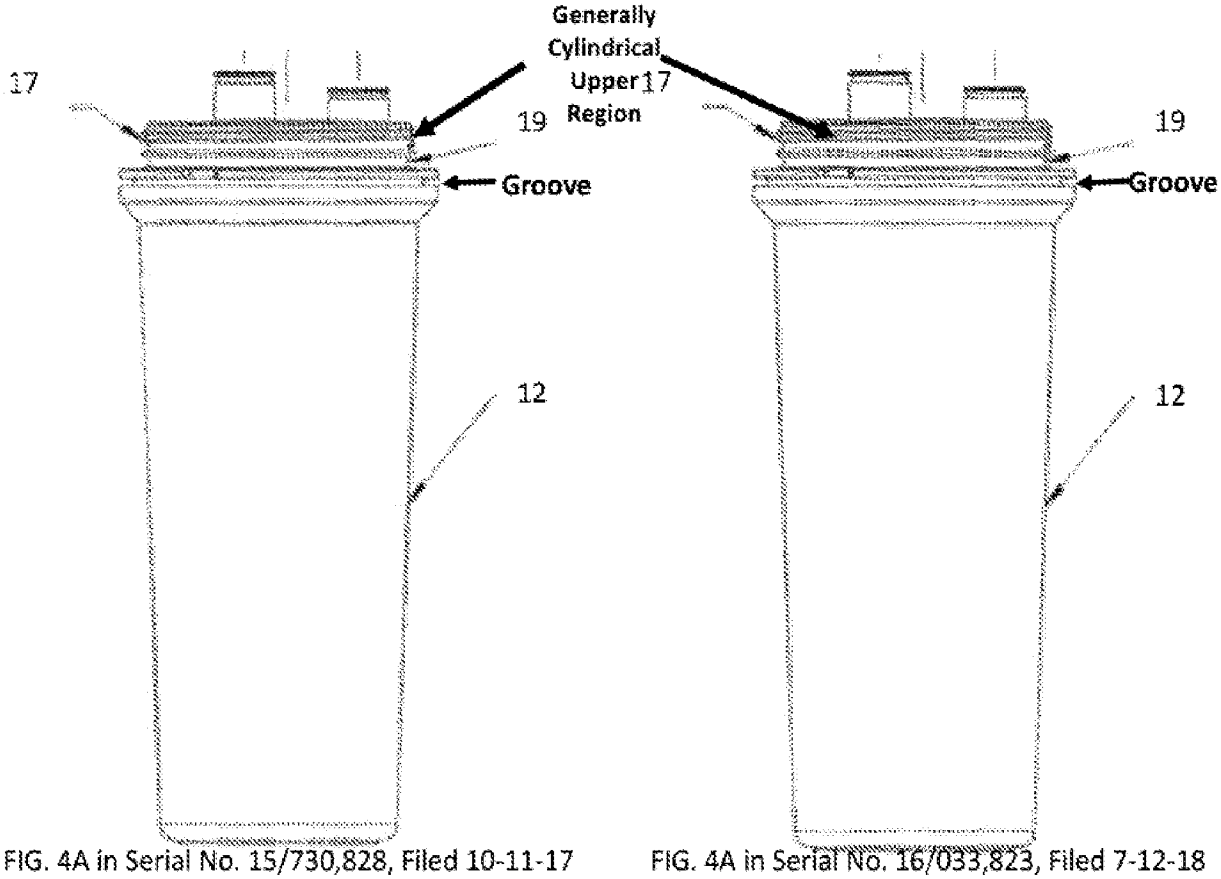


FIG. 4A in Serial No. 15/730,828, Filed 10-11-17

FIG. 4A in Serial No. 16/033,823, Filed 7-12-18

Further, FIG. 4A in both provisional applications (U.S. Provisional Application Serial No. 62/414,712, filed on Oct. 29, 2016, and U.S. Provisional Application Serial No. 62/406,990) also illustrates this same circumferentially extending groove.

However, in the Replacement Drawings that were later filed in both the U.S. Application No. 16/033,823 and U.S. Application No. 15/730,828 (and in the parent U.S. Application No. 16/941,522), there are blurry dotted lines near where the groove is located. As the current application (and the parent application) claim priority to these prior applications, Applicant is submitting with this current original drawing set the originally filed version of FIG. 4A from U.S. Application No. 16/033,823 and U.S. Application No. 15/730,828 to ensure the groove is clearly illustrated.

Conclusion

Applicant submits that the claims are in a condition for allowance and action toward that end is earnestly solicited. If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact Applicant's undersigned attorney at the number indicated.

Respectfully submitted,

Date: October 13, 2022

By: /Steven R. Lazar/
Steven R. Lazar
Attorneys for Applicant
Registration No. 32,618