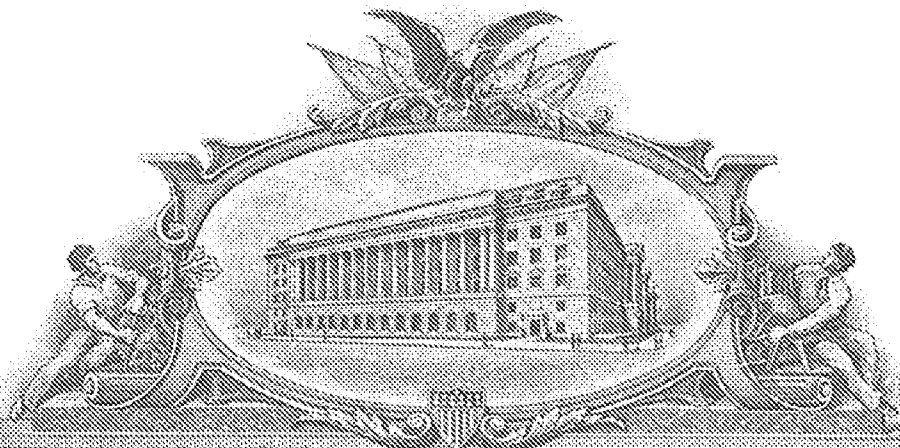


DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

International application number:	PCT/US2019/044225
International filing date:	30 July 2019 (30.07.2019)
Document type:	Certified copy of priority document
Document details:	Country/Office: US
	Number: 62/711,942
	Filing date: 30 July 2018 (30.07.2018)
Date of receipt at the International Bureau:	09 August 2019 (09.08.2019)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a),(b) or (b-bis)

1014195



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

August 08, 2019

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 62/711,942

FILING DATE: *July 30, 2018*

RELATED PCT APPLICATION NUMBER: *PCT/US19/44225*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US62/711,942*



Certified by

Anders Ivarsson

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name

Middle Name

Family Name

City

State

Country i

John

Thomas

Rogers

Garland

TX

US

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

Add

Title of Invention

CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS

Attorney Docket Number (if applicable)

PERF04-00044

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number

☐ Firm or Individual Name

Customer Number

23990

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

• No.

Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:

Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Entity Status**Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29**

- ☒ Applicant asserts small entity status under 37 CFR 1.27
- ☐ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ☐ No

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 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.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	Daniel E. Venglarik /		Date (YYYY-MM-DD)	2018-07-30	
First Name	Daniel E.	Last Name	Venglarik	Registration Number (If appropriate)	39409

This collection of information is required by 37 CFR 1.51. 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 8 hours 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. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

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.

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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		
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		
	John	Thomas	Rogers			
Residence Information (Select One) • ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Garland	State/Province	TX	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	1214 Creekwood Drive					
Address 2						
City	Garland	State/Province	TX			
Postal Code	75044	Country i	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	23990		
Email Address	patents@munckwilson.com	Add Email	Remove Email

Application Information:

Title of the Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		
Attorney Docket Number	PERF04-00044	Small Entity Status Claimed ☒	
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	9	Suggested Figure for Publication (if any)	

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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		

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	23990		

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		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button. Add			

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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		

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).

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

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. 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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		

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.

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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		

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	Performance Pulsation Control, Inc.		
-------------------	-------------------------------------	--	--

Mailing Address Information For Applicant:

Address 1	3309 Essex Drive, Suite 200		
Address 2			
City	Richardson	State/Province	TX
Country	US	Postal Code	75082
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.

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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		

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	/Daniel E. Venglarik /		Date (YYYY-MM-DD)	2018-07-30
First Name	Daniel E.	Last Name	Venglarik	Registration Number
			39,409	

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

Add

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	PERF04-00044
		Application Number	
Title of Invention	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

PERF04-00044

PROVISIONAL PATENT

**CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED
CARTRIDGES IN SUCTION STABILIZERS**

Inventor:

John Thomas Rogers
1214 Creekwood Drive
Garland
Dallas County
Texas 75044
United States Citizen

**CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED
CARTRIDGES IN SUCTION STABILIZERS****TECHNICAL FIELD**

[0001] The present application relates generally to the operation of suction stabilizers in reciprocating pump systems and, more specifically, to providing a maintenance-free suction stabilizer employing closed-cell gas infused closed cell material.

BACKGROUND

[0002] Within closed fluid pumping systems, fluid pulsation or cavitation may occur in response to the sudden change of pressure associated with acceleration or deceleration of the fluid. Because fluid generally has very low compressibility, any applied force must be accounted for and variation in fluid movement can cause pulsations that, if not dampened, may become extreme and damage the pump or other portions of the piping system. Fluid pressure pulsations may result, for example, when fluid fails to maintain contact with the face of the pump's plunger as it retracts to pull fluid into the pump. When the plunger subsequently moves forward to discharge the fluid, the fluid may impact the plunger face to cause vibration or pulsation. Dramatic swings in fluid pressure during a pump cycle may have an analogous effect.

[0003] Suction stabilizers and discharge dampeners help keep the fluid in constant contact with a pump plunger and/or reduce pressure variation during the pump cycle. Typically using gas-filled bladders, especially for large pressure variations (due the compressibility of gas), suction stabilizers and discharge dampeners act as a shock absorber to absorb the forces associated with flow variations and rapid fluid acceleration and deceleration during the pump stroke cycle. However, the gas-filled bladders require periodic maintenance to replenish the gas charge within

the bladder. Failure to maintain the proper gas charge degrades the performance of the stabilizer and, in extreme cases, negates any benefit from installing the suction stabilizer or discharge dampener.

SUMMARY

[0004] An annular tube of cellular material is supported by structures protruding from the bottom surface of a suction stabilizer's head and/or by structures within the interior volume of the annular body of the suction stabilizer, preferably with spacing between the outer diameter of the annular tube of the cellular material and the inner walls of the suction stabilizer body. Gas-infused closed cell material may thus be employed in new suction stabilizer or to retrofit existing suction stabilizers designed for a gas-filled bladder.

[0005] Before undertaking the DETAILED DESCRIPTION below, it may be advantageous to set forth definitions of certain words and phrases used throughout this patent document: the terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation; the term "or," is inclusive, meaning and/or; and the phrases "associated with" and "associated therewith," as well as derivatives thereof, may mean to include, be included within, interconnect with, contain, be contained within, connect to or with, couple to or with, be communicable with, cooperate with, interleave, juxtapose, be proximate to, be bound to or with, have, have a property of, or the like. Definitions for certain words and phrases are provided throughout this patent document, those of ordinary skill in the art should understand that in many, if not most instances, such definitions apply to prior, as well as future uses of such defined words and phrases.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] For a more complete understanding of the present disclosure and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which like reference numerals represent like parts:

[0007] FIG. 1 illustrates a pump system with suction stabilizer within which a cellular tube may be mounted according to various embodiments of the present disclosure;

[0008] FIG. 2 is an illustration of a typical suction stabilizer structure within which a cellular tube may be mounted according to various embodiments of the present disclosure;

[0009] FIG. 2A is an illustration of a gas-filler bladder cartridge that may be used in the suction stabilizer structure of FIG. 2;

[0010] FIG. 3 is a diagrammatic view of fluid flow through a suction stabilizer within which a cellular tube is mounted according to one of the various embodiments of the present disclosure; and

[0011] FIGS. 4 through 11 each depict alternatives for mounting a cellular tube within a suction stabilizer according to one of the various embodiments of the present disclosure.

DETAILED DESCRIPTION

[0012] FIGS. 1 through 11, discussed below, and the various embodiments used to describe the principles of the present disclosure in this patent document are by way of illustration only and should not be construed in any way to limit the scope of the disclosure. Those skilled in the art will understand that the principles of the present disclosure may be implemented in any suitably arranged suction stabilizing device that can be used to control or partially control suction pulsation energy amplitudes.

[0013] Gas charged bladder suction stabilizers and pulsation dampeners enable large pressure swings to be dampened, depending on the pressure of the gas within the bladder. While potentially more limited in the range of pressure spikes that can be reduced, gas-infused closed cell material—that is, compressible elastomers with closed micro-cells infused with gas—do not require gas replenishment as is typical with bladders, and as therefore often referred to as “maintenance free.” However, mounting cellular material within a suction stabilizer and sizing the suction stabilizer for effective operation presents obstacles that are not easily overcome.

[0014] FIG. 1 illustrates a pump system with suction stabilizer within which a cellular tube may be mounted according to various embodiments of the present disclosure. The embodiment of the pump system 100 illustrated in FIG. 1 is for illustration only, and does not limit the scope of this disclosure to any particular implementation.

[0015] Pump system 100 includes a reciprocating pump 101 coupled to intake piping 102 and outlet piping 103. A suction stabilizer 104 is coupled to the intake piping 102 and, in the embodiment depicted, a discharge dampener 105 is coupled to the outlet piping 103. The pump 101 receives fluid (which may be a slurry including particulate solids) by suction through the intake piping 102 during one part of the reciprocating pump stroke cycle and discharges the fluid

into the outlet piping 103, to elevate the fluid, increase pressure within the pumped fluid, or the like.

[0016] FIG. 2 is an illustration of a typical suction stabilizer structure within which a cellular tube may be mounted according to various embodiments of the present disclosure. The suction stabilizer 104 depicted in FIG. 2 includes an annular body 200 with a concentric reducer 201 at the bottom thereof. Via the reducer 201, a fluid passage 202 connects the internal volume of the annular body 200 to mounting flange 203 and to an opening centered therein for fluid passage into and out of the internal volume. During use, the mounting flange 203 is typically secured to a counterpart flange around an opening into the intake piping (not shown in FIG. 2) in a manner sealing the mating of the two flanges against fluid leaks. At the top of the annular body 200, a head 204 includes threads received by counterpart threads inside the top, inner surface of the annular body 200 and a disk-shaped plate, closing the upper opening of the annular body 200. As shown, a hex nut on the upper surface of the head 204 allows the head 204 to be screwed into and out of the annular body 200 to seal the upper end. The material of the annular body 200, reducer 201, fluid passage 202, mounting flanges 203, and head 204 is typically metal (e.g., steel) of sufficient thickness to withstand the anticipated fluid pressures, often with an additional material coating internal surfaces that are contacted by the pumped fluid to inhibit corrosion by the fluid from the inside. A plate 205 with manufacturer, model, rating and/or safety information may be affixed to an external surface of the annular body 200. Other types of annular bodies and head combinations may be used.

[0017] FIG. 2A is an illustration of a gas-filled bladder cartridge that may be used in the suction stabilizer structure of FIG. 2. In the embodiment shown in FIG. 2A, the mechanism for absorbing fluid pressure variations, the bladder cartridge 207, hangs from a central portion of the

bottom surface of the head 204. In the example shown, bladder cartridge 207 is molded and bonded to head 204 and plug 208. A steel band 206 is crimped onto the surface of the bladder cartridge 207 exerting pressure inward on the surface of the bladder cartridge 207 and further onto the bond between the bladder cartridge 207 and head 204 and plug 208. Fluid pressure variation in this embodiment is absorbed by movement of the plug 208 and compression of the bladder 207.

[0018] FIG. 3 is a diagrammatic view of fluid flow through a suction stabilizer within which a cellular tube is mounted. For simplicity and clarity, the reducer, fluid passage and mounting flange have been eliminated and fluid flow from the intake piping to the outlet piping is represented as occurring across the open bottom of the internal volume of the annular housing 200. Inflowing fluid 301 with high magnitude pump pulsations has its flow interrupted by an effective baffle 302 aligned with the opening into the internal volume of the annular housing 200, such that at least part of the fluid flows into that internal volume. Outflowing fluid 303 from the internal volume has reduced or low magnitude pulsations. An annular cellular material 304 is mounted within the internal volume and includes gas-filled closed cells 305 optionally enclosed within a cover or skin 306. Fluid pressure variation in this embodiment is absorbed by compression of the gas-filled closed cells 305.

[0019] One challenge with use of gas-infused closed cell material in a suction stabilizer is mounting the cellular material within the annular body in an operational manner providing the desired reduction the magnitude of fluid pulsations. An optimal mounting system would accommodate both retrofit of installed gas-filled bladder suction stabilizers and manufacture of new suction stabilizers with a cellular part. Of different installation and retention approaches possible, merely dropping a cellular tube into the internal volume of the annular housing result in

a possible problem if the cellular tube ends up creating a seal between the outer diameter of the cellular tube and the inner diameter of the annular housing wherever the tube comes to rest. This could be of particular concern in “well service” pumping where sand may build up in the space between the cellular tube and the inside of the annular housing. Because of that potential problem, hanging the cellular tube from the head of the suction stabilizer, with space between the cellular tube and the inner walls of the annular housing, is preferable.

[0020] FIGS. 4 through 11 each depict alternatives for mounting a cellular tube within a suction stabilizer according to one of the various embodiments of the present disclosure. The embodiments of FIGS. 4 through 11 are for illustration only, and do not limit the scope of this disclosure to any particular implementation. For the retrofit situation, hanging the cellular tube from the head of the suction stabilizer probably requires a new head, since the original head normally has a gas-filled bladder cartridge affixed to it. In each of the embodiments of FIGS. 4 through 11, the head is sized to match the size of the head being replaced on the suction stabilizer being retrofitted, and thread lead, pitch, start, handedness, angle and diameter are likewise selected based on that of the head being replaced. The size and location of any seals should also be matched, and either or both of the head materials and the size of the hex nut may optionally be selected for consistency.

[0021] In each of the examples of FIGS. 4 through 11, a simple annular tube of cellular material with flat surfaces is depicted, although other shapes (e.g., solid cylinder) and surface contours (e.g., tri-lobe) may also be employed. In each of the embodiments of FIGS. 4 through 11, the size and shape of the cellular material is selected so that the amount of cellular material is sufficient to absorb anticipated pressure variations for the particular application contemplated. Preferably, an annular tube is employed, sized to leave space between the outer surface of the

tube and the inner surface of the suction stabilizer's annular housing. If necessitated by size constraints on the suction stabilizer housing, however, the cellular material may be large enough to abut the inner housing surface. In each of the embodiments of FIGS. 4 through 11, particular structures (such as an annular support for the cellular tube on the head) may be formed in the same general manner as described for similar structures in any of the other embodiments.

[0022] In the embodiment of FIG. 4, a support 400 is provided on the bottom side of the plate for the suction stabilizer head 204, either (for example) by being integrally formed as part of the suction stabilizer head or by being welded onto the surface of the suction stabilizer head. In the example shown, the support 400 is an annular structure protruding from the head 204 and having an outer diameter sized to match the inner diameter of the annular tube of cellular material, which includes the gas-infused cells 401 and a cover 402, as described above. The support 400 includes a notch 403 (e.g., a circumferential groove) on the outer surface thereof that is sized and positioned to mate with a protrusion 404 on the inner surface of the cover 402. The annular tube of cellular material is thus mounted by a snap-fit of the protrusion on the cover 402 with the notch 403. In a variant depicted in FIG. 5, an outer surface of the annular support 500 is simply directly bonded (e.g., by a suitable adhesive 503) to a portion of the cover 502 on the gas-infused cells 501.

[0023] In the embodiment of FIG. 6, the annular support 600 includes aligned holes 603 there through for receiving a pin 604 that also extends through corresponding holes 605 through the gas-infused cells 601 and cover 602. In a variant depicted in FIG. 7, the annular support 700 includes aligned holes 703 there through for receiving a pin 704 that also extends through corresponding holes in a cap 706 molded onto an end of the annular tube formed by the gas-infused cells 701 and cover 702. In another variant depicted in FIG. 8, the support(s) 800 may

be added to a head 204, such as by forming threaded holes in the bottom surface of the head 204 and screwing in threaded eyebolts as shown. A pin 804 is received through hole(s) in the support(s) 800, and also extends through corresponding holes 805 through the gas-infused cells 801 and cover 802.

[0024] In the embodiment of FIG. 9, the annular tube formed by the gas-infused cells 901 and cover 902 is supported from the bottom by a perforated plate 900 suspended within the suction stabilizer housing from the head 204 by a chain or cable. The perforated plate 900 suspended by a chain or cable may also be used within any of the embodiments of FIGS. 4 through 8, in conjunction with the mounting mechanism described for the respective embodiment. In addition, a perforated plate of the type depicted in FIG. 9, optionally with upwardly protruding guides for receiving the bottom end of the annular tube formed by the gas-infused cells and cover, may be mounted (e.g., by welding) as a shelf within the suction stabilizer housing. Such a shelf may be used either alone or in combination with any of the embodiments of FIGS. 4 through 8, in conjunction with the mounting mechanism described for the respective embodiment.

[0025] In the embodiments of FIGS. 10 and 11, the annular tube formed by the gas-infused cells 1001 and cover 1002 is supported from the bottom and outer sides by a perforated (e.g., mesh or slotted) cage 1000 size to fit within the interior volume of the annular body for the suction stabilizer and to receive the annular tube of cellular material. In the example depicted in FIG. 10, the cage 1000 is secured within and to the annular body for the suction stabilizer, such as by welding a portion 1003 of the cage 1000 to an inner surface of the suction stabilizer's annular body. In the example depicted in FIG. 11, the cage 1100 is removable, such as by having a flange 1103 that is clamped between the head 204 and the suction stabilizer's annular body when the head 204 is threaded into the upper opening of the annular body. Either of the cages depicted

in FIGS. 10 and 11 may be used either alone or in combination with any of the embodiments of FIGS. 4 through 8, in conjunction with the mounting mechanism described for the respective embodiment.

[0026] The benefits of employing gas-infused closed cell material within a suction stabilizer in the manner described herein include elimination of gas charging maintenance in the suction stabilizer, increased performance consistency of the suction stabilizer over time, operation of the suction stabilizer over a larger operating pressure range than could be achieved with alternative implementations of gas-filled bladders or gas-infused closed cell material, easier removal for change at some future time, and less weight.

[0027] Although the present disclosure has been described with exemplary embodiments, various changes and modifications may be suggested to one skilled in the art. It is intended that the present disclosure encompass such changes and modifications as fall within the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A cellular suction stabilizer retrofit part, comprising:
a head configured to attach to and seal an opening at an upper end of a suction stabilizer body;
an annular tube comprising gas-infused cells surrounded by a cover; and
means for securing the annular tube to the head and/or within the suction stabilizer body with a space between an outer surface of the annular tube and an inner surface of the suction stabilizer annular body.

ABSTRACT

An annular tube of cellular material is supported by structures protruding from the bottom surface of a suction stabilizer's head and/or by structures within the interior volume of the annular body of the suction stabilizer, preferably with spacing between the outer diameter of the annular tube of the cellular material and the inner walls of the suction stabilizer body. Gas-infused closed cell material may thus be employed in new suction stabilizer or to retrofit existing suction stabilizers designed for a gas-filled bladder.

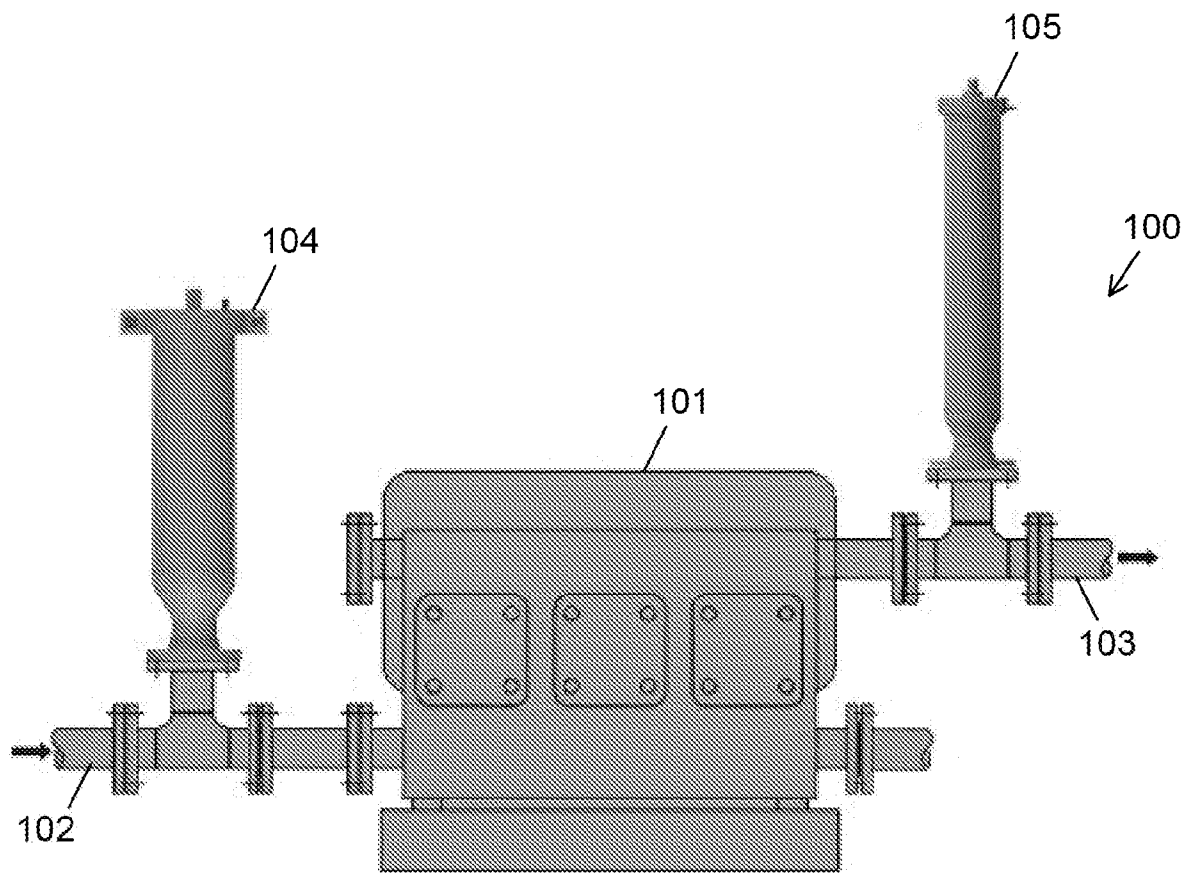


FIG. 1

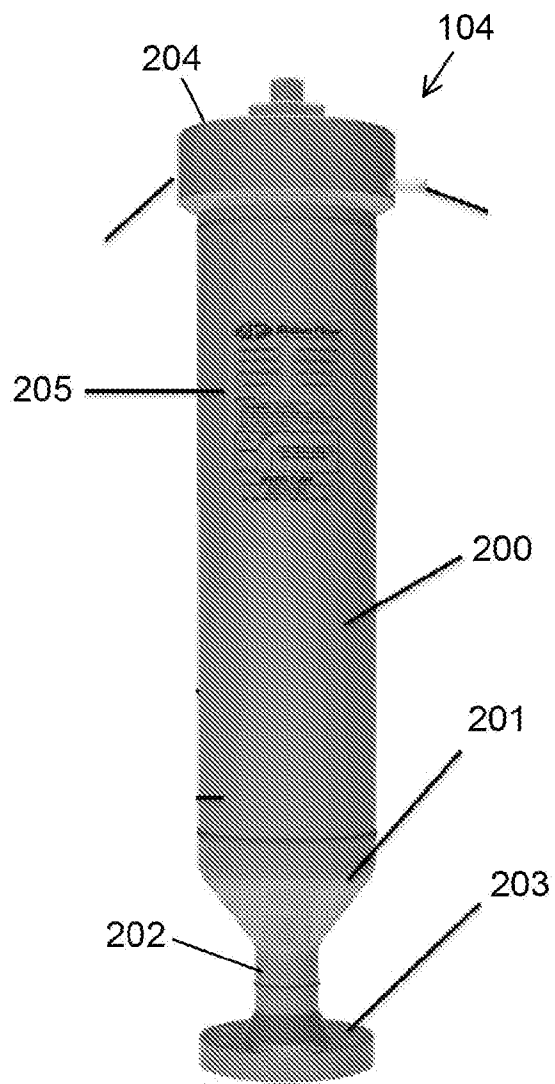


FIG. 2

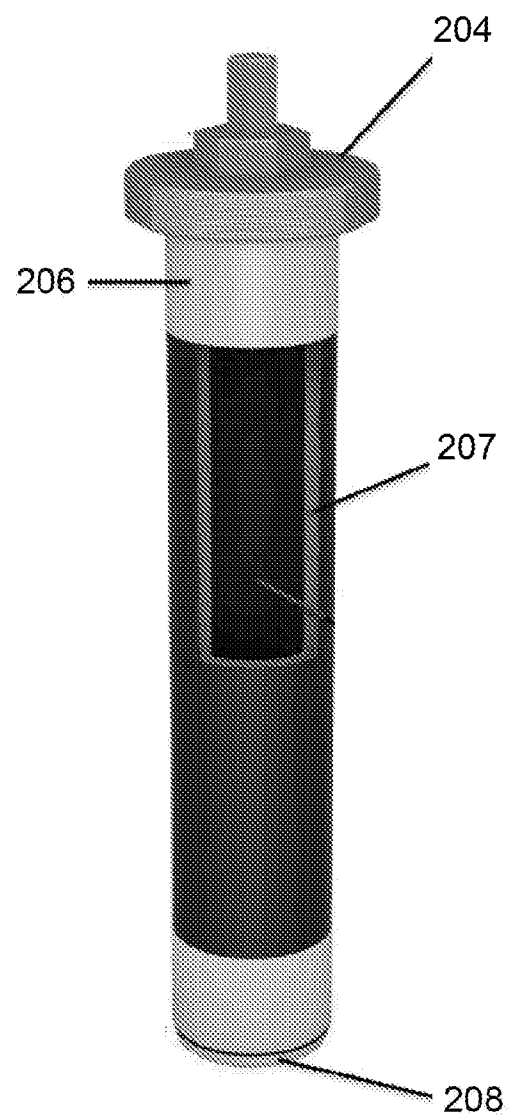


FIG. 2A

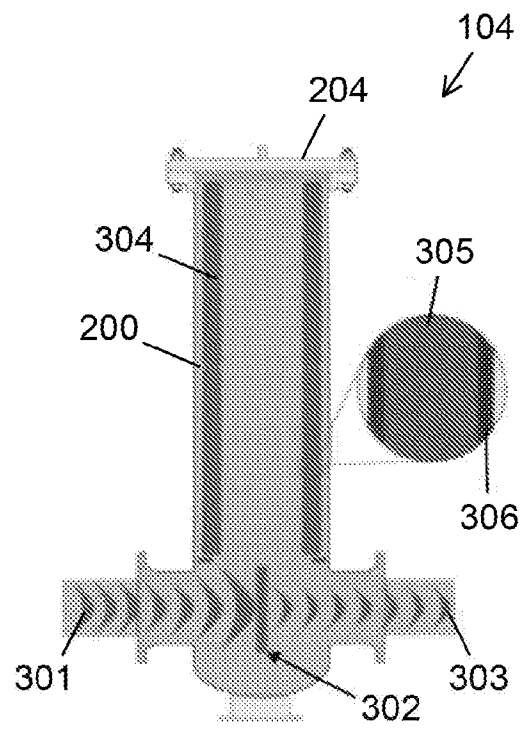


FIG. 3

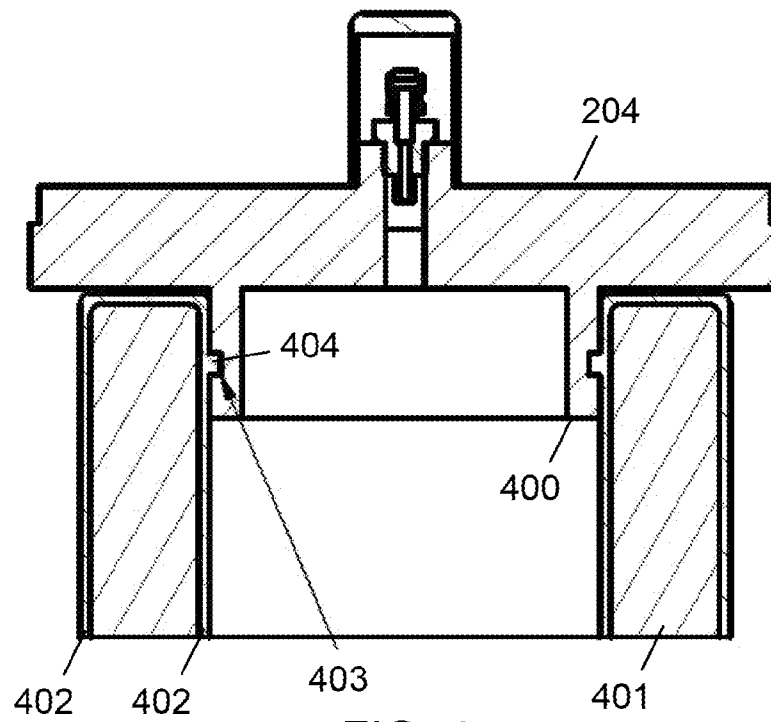


FIG. 4

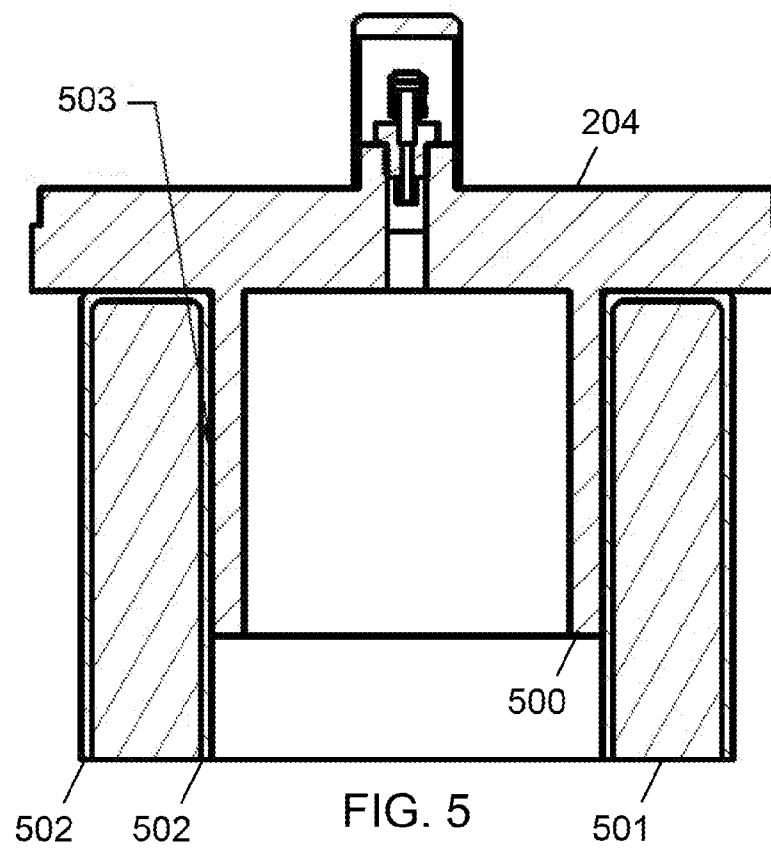
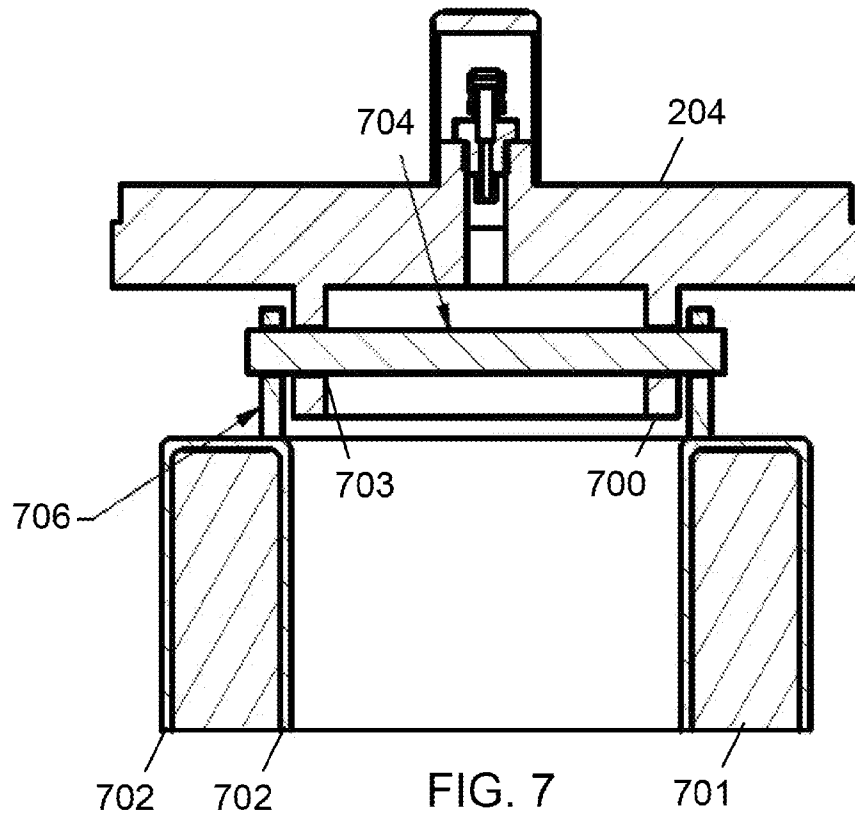
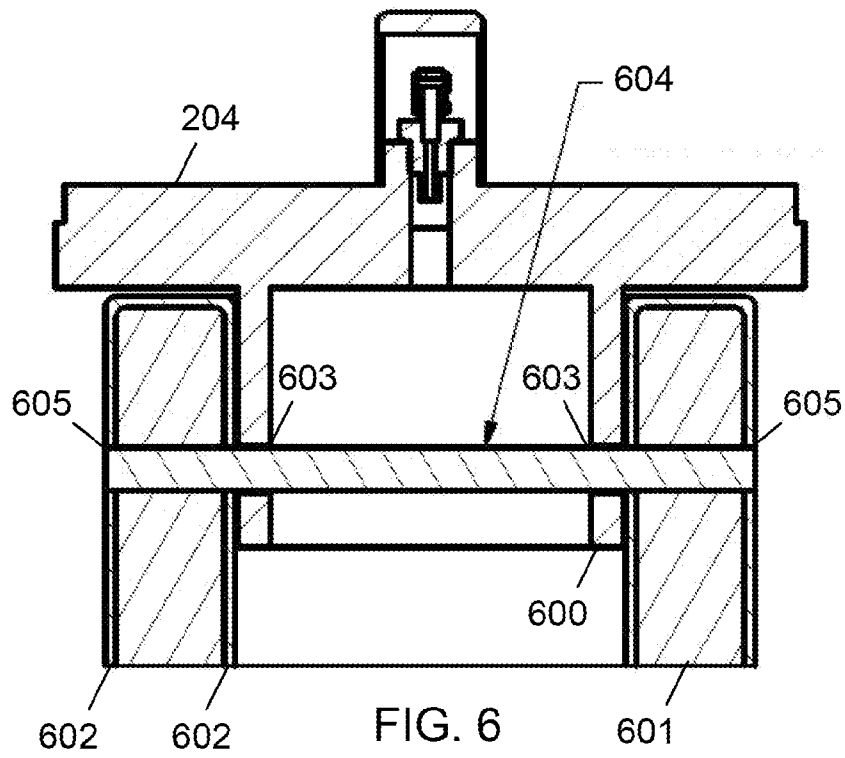
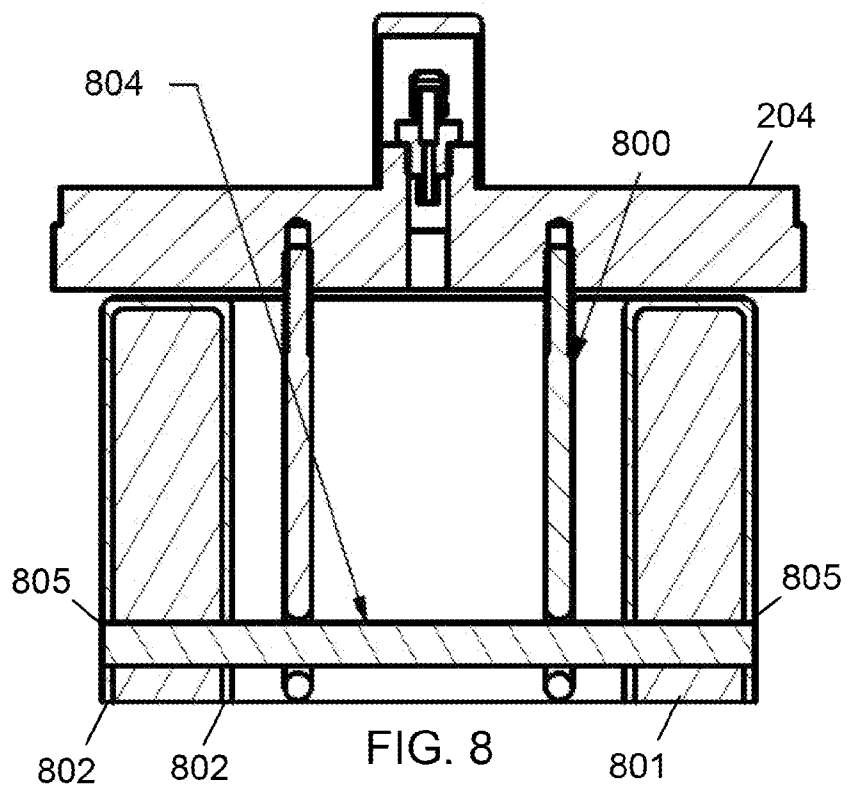


FIG. 5





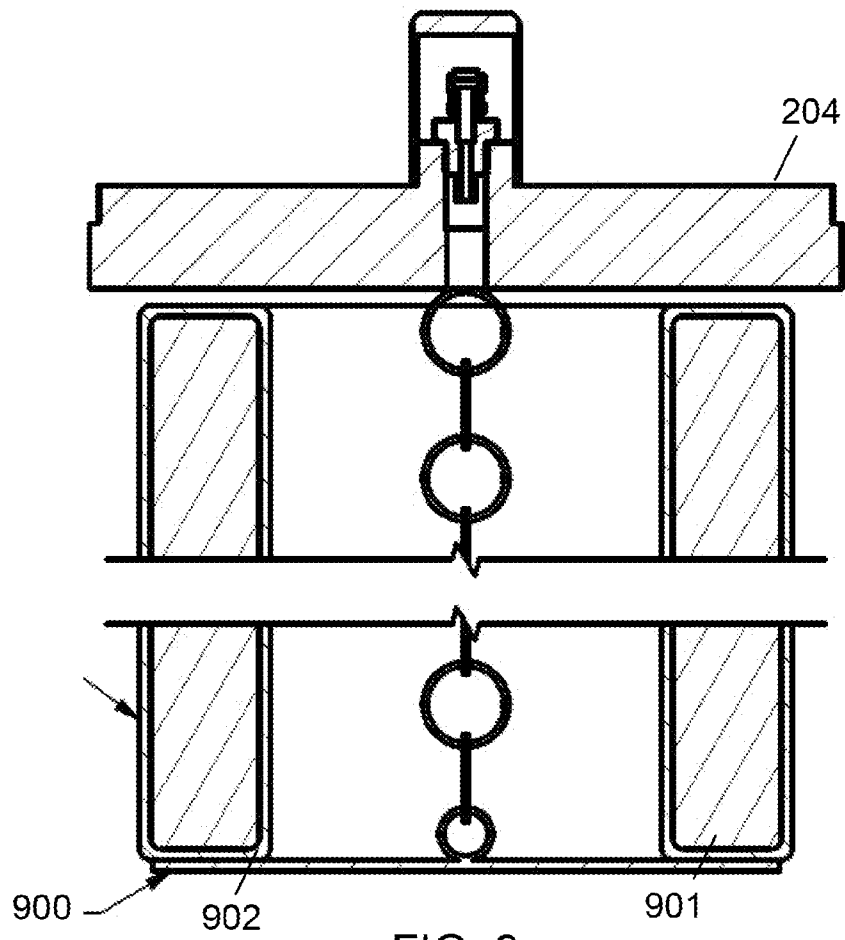


FIG. 9

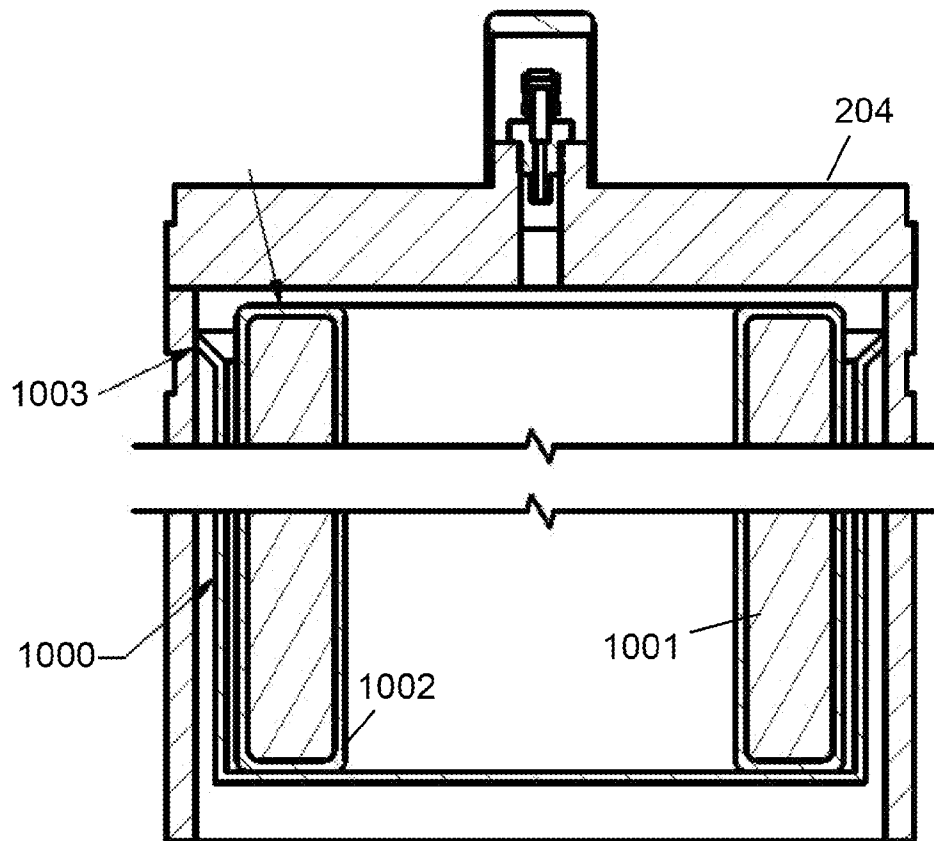
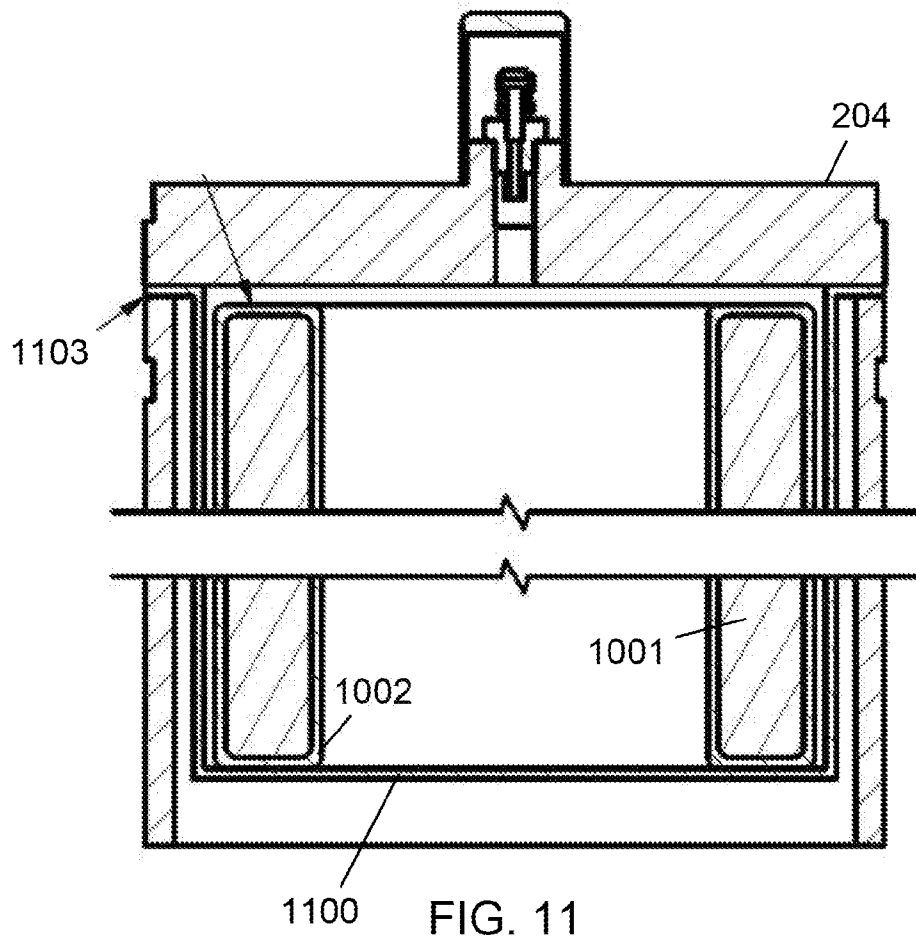


FIG. 10



Electronic Acknowledgement Receipt

EFS ID:	33321082
Application Number:	62711942
International Application Number:	
Confirmation Number:	1074
Title of Invention:	CELLULAR TUBE FOR REPLACEMENT OF TRADITIONAL GAS-CHARGED CARTRIDGES IN SUCTION STABILIZERS
First Named Inventor/Applicant Name:	John Thomas Rogers
Customer Number:	23990
Filer:	Daniel Venglarik/Brandy Calderon
Filer Authorized By:	Daniel Venglarik
Attorney Docket Number:	PERF04-00044
Receipt Date:	30-JUL-2018
Filing Date:	
Time Stamp:	16:41:59
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 140
RAM confirmation Number	073118INTEFSW16424300
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	Provisional Cover Sheet (SB16)	PERF04-00044_Provisional_Cover_Sheet_073018.pdf	1477216	no	3
			6f8041c58307e4a5846d53ccfb740a2b3448e993		
Warnings:					
Information:					
2	Application Data Sheet	PERF04-00044_ADS_073018.pdf	1823001	no	8
			d0ba92370941c61fe913fade26f2ba2e7f76f250		
Warnings:					
Information:					
3	Specification	PERF04-00044_Provisional_Specification_073018.pdf	103605	no	14
			889fdfff751c66a5f367e2ddcf2751ad6f2b8ba2		
Warnings:					
Information:					
4	Drawings-only black and white line drawings	PERF04-00044_Provisional_Drawings_073018bw.pdf	1946576	no	9
			0e445a3c0e42a8d97ba10993cf2c6ea736a29b00		
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	29566	no	2
			02J03c921e2b16c6da685626b35dcca89a414d26		
Warnings:					
Information:					
Total Files Size (in bytes):			5379964		

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.