

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Attorney Docket No.: 3338.005US7

Customer No.: 21186

PATENT APPLICATION TRANSMITTAL

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items and information (as indicated with an "X"):

X CONTINUATION under 37 CFR 1.53(b) of prior Patent Application No. 14/318,270 comprising:

X Specification (31 pgs, including claims numbered 1 through 1 and a 1 page Abstract).

X Formal Drawing(s) (10 sheets).

X Application Data Sheet (7 pgs).

X Copy of signed Declaration (3 pgs) from prior application.

X **Authorization to charge Deposit Account 19-0743 in the amount of \$1,600.00**

X Preliminary Amendment (3 pgs).

The filing fee has been calculated below as follows:

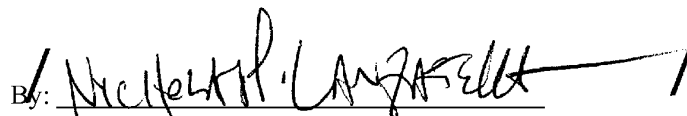
	No. Filed	No. Extra	Rate	Fee
TOTAL CLAIMS	1 - 20	0	x \$80.00 =	\$0.00
INDEPENDENT CLAIMS	1 - 3	0	x \$420.00 =	\$0.00
[] MULTIPLE DEPENDENT CLAIMS PRESENTED				\$0.00
BASIC FEE				\$280.00
SEARCH FEE				\$600.00
EXAMINATION FEE				\$720.00
	No. of pages (75% for e-filing)	Extra sets of 50 pages	Rate	
APPLICATION SIZE FEE	(31 - 100) / 50	0	\$400.00	\$0.00
TOTAL				\$1,600.00

Please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer Number: 21186

By:



Nicholas P. Lanzatella

Reg. No. 63,803

Date of Deposit: May 14, 2015

This paper or fee is being filed on the date indicated above using the USPTO's electronic filing system EFS-Web, and is addressed to The Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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: Edwin S. Olson					
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Edwin	S.	Olson		
Residence Information (Select One)					
☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Grand Forks	State/Province	ND	Country of Residence	United States of America
Mailing Address of Inventor:					
Address 1	223 Circle Hills Drive				
Address 2					
City	Grand Forks	State/Province	ND		
Postal Code	58201	Country	United States of America		
Inventor 2: Michael J. Holmes					
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Michael	J.	Holmes		
Residence Information (Select One)					
☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Thompson	State/Province	ND	Country of Residence	United States of America
Mailing Address of Inventor:					
Address 1	614 6th Avenue Northeast				
Address 2					
City	Thompson	State/Province	ND		
Postal Code	58278	Country	United States of America		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

Inventor 3: John Henry Pavlish				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	John	Henry	Pavlish	
Residence Information (Select One)				
☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	East Grand Forks	State/Province	MN	Country of Residence United States of America
Mailing Address of Inventor:				
Address 1	42204 210th Street SW			
Address 2				
City	East Grand Forks	State/Province	MN	
Postal Code	56721	Country	United States of America	

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	21186
Email Address	request@slwip.com

Application Information:

Title of the Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
Attorney Docket Number	3338.005US7	Small Entity Status Claimed	☐
Application Type	Non-Provisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	
Filing By Reference:			

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

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

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). Enter either 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	21186		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status	Pending		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
This Application	continuation of	14/318,270	2014-06-27
Prior Application Status	Patented		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14/318,270	continuation of	13/966,768	2013-08-14
Prior Application Status	Patented		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13/966,768	continuation of	13/427,665	2012-03-22
Prior Application Status	Patented		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13/427,665	continuation of	12/419,219	2009-04-06
Prior Application Status	Abandoned		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12/419,219	continuation of	12/201,595	2008-08-29
Prior Application Status	Patented		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12/201,595	division of	11/209,163	2005-08-22
Prior Application Status	Expired		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/209,163	Claims benefit of provisional	60/605,640	2004-08-30

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the POX 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	Parent Filing Date (YYYY-MM-DD)	Access Code (if applicable)

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices
If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Applicant: Energy & Environmental Research Center Foundation				
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.				
☒ 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:				
☐ Deceased	☐ Legally incapacitated			
Name of the Deceased or Legally Incapacitated Inventor :				
If the Applicant is an Organization check here: ☒				
Organization Name: Energy & Environmental Research Center Foundation				
Prefix	Given Name	Middle Name	Family Name	Suffix

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

Mailing Address Information:			
Address 1	15 North 23rd Street, Stop 9017		
Address 2			
City	Grand Forks	State/Province	ND
Country	United States of America	Postal Code	58202-9017
Phone Number			
Email Address			

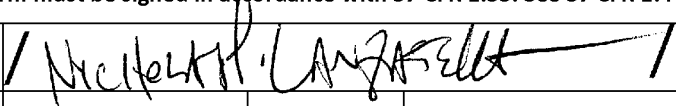
Assignee Information including Non-Applicant Assignee Information:

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.				
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.				
If the Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				

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.

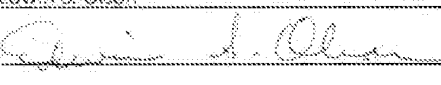
Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3338.005US7
	Application Number	Unknown
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form 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.		

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature				Date (YYYY-MM-DD)	2015-05-14
First Name	Nicholas P.	Last Name	Lanzatella	Registration Number	63,803

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 22313-14**

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

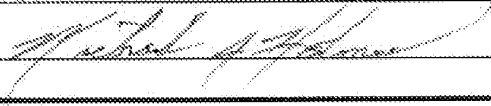
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
As the below named inventor, I hereby declare that: This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>13/966,768</u>, filed on <u>August 14, 2013</u>. 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 (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: <u>Edwin S. Olson</u> Date (Optional) : _____ Signature: <u></u> Note: An application data sheet (PTO/58/14 or equivalent), including naming the entire inventive entity, must accompany this form. 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 3 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 FEE 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-8199 and select option 2.

3338.D05U55

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
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 <u>13/966,768</u>, filed on <u>August 14, 2013</u>. 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 (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: <u>Michael J. Holmes</u> Date (Optional): <u>Oct. 24, 2013</u> Signature: <u></u> Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. 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 this form, call 1-800-PTO-8199 and select option 2.

3338.005U55

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
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 <u>13/966,768</u>, filed on <u>August 14, 2013</u>. 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 (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: <u>John Henry Pavlish</u> Date (Optional) : _____ Signature: <u><i>John Pavlish</i></u> Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/Q1 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.

3338.005USS

SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. Patent Application No. 11/209,163 filed August 22, 2005, entitled "Sorbents for the Oxidation and Removal of Mercury", which claims the benefit of U.S. Provisional Application Serial No. 60/605,640, filed August 30, 2004, both applications are hereby incorporated herein by reference in their entirety for all purposes.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] This invention was made with United States Government support under Grant Numbers R 827649-01 and CR 830929-01 awarded by the United States Environmental Protection Agency and under Contract Number DE-FC26-98FT40320 awarded by the United States Department of Energy. The United States Government has certain rights in this invention.

BACKGROUND OF THE INVENTION

Technical Field of the Invention

[0003] The present invention relates to methods and materials for the removal of pollutants from flue gas or product gas from a gasification system. In particular, mercury is removed from gas streams generated during the burning or gasification of fossil fuels by highly reactive regenerable sorbents.

Background of the Invention

[0004] The combustion and gasification of fossil fuel such as coal generates flue gas that contains mercury and other trace elements that originate from the fuel. The release of the mercury (and other pollutants) to the environment must be controlled by use of sorbents, scrubbers, filters, precipitators, and other removal technologies. Mercury is initially present in the elemental form during combustion and gasification. In downstream process sections, such as in the ducts and stack of a combustion system, some of the elemental mercury is oxidized. The amount that is oxidized depends on the amount of acid gases present in the flue gas and other factors. Amounts of mercury vary with the fuel, but concentrations of mercury in the stream of flue gas from coal combustion are typically less than 5 parts per billion (ppb). Large coal combustion facilities such as electric utilities may emit a pound of mercury, or more, per day. Mercury removal applications include, without limitation, flue gas from coal (or other fossil fuel) combustion, waste incineration, product gas from

gasification, as well as off gases from mineral processing, metal refining, retorting, cement manufacturing, chloralkali plants, dental facilities, and crematories.

Mercury Sorbent Technologies

[0005] Several types of mercury control methods for flue gas have been investigated, including injection of fine sorbent particles into a flue gas duct and passing the flue gas through a sorbent bed. Fine-particle injection sorbents include activated carbon, metal oxide sorbent, sodium sulfide particles, and basic silicate or oxide sorbents. When particle injection is employed, the mercury captured on the sorbent particles is removed from the gas stream in a bag house or electrostatic precipitator (ESP) and collected along with ash particulate. The sulfide and basic silicate and oxide particles are effective only for the oxidized mercury, and the metal oxide sorbents exhibit slower capture kinetics than the carbon particles. Additionally, injection of fine carbon particles into the flue gas stream has been only partially successful in removing mercury, especially elemental mercury, where effective removal of only about 60% is attained for some applications with a FF (fabric filter) to collect carbon and ash. Even lower removal rates have been observed when using an ESP to collect the carbon because the contact time of the carbon with the gas is very short.

[0006] A major problem with existing carbon injection systems is that the sorbent is initially unreactive, and only after extended exposure to the flue gas does the sorbent become effectively seasoned and provide increased reactivity with the mercury in the gas. Consequently, these sorbents must be used in large amounts, at high sorbent-to-mercury ratios, to effectively capture the mercury. These sorbents tend to be relatively expensive and cannot be easily separated from the ash for regeneration and reuse. The collection of carbon in the ash also creates solid waste disposal problems, and the spent sorbent may contaminate the collected ash, preventing its use in various applications.

[0007] Accordingly, there remains a need for more economical and effective mercury removal technology. This invention provides for cost-effective removal of pollutants including mercury, using sorbent enhancement additives and/or highly reactive sorbents, with contact times of seconds (or less), and that may be regenerated and reused.

SUMMARY

[0008] It is thus an object of the present invention to overcome the deficiencies of the prior art and thereby to provide new and economical methods for the removal of mercury from the gases produced in the utilization of fossil fuels.

[0009] A halogen/halide promoted activated carbon sorbent is described that is highly effective for the removal of mercury from flue gas streams. The sorbent comprises a new halide-modified carbon form containing a reactive compound produced by the reaction of bromine (or halide or other halogen) with the carbon. Optional secondary components and alkali may be added to further increase reactivity and mercury capacity. Mercury removal efficiencies obtained exceed or match conventional methods with added benefits such as reduced costs. Optionally, the sorbent can be regenerated and reused. Sorbent treatment and/or preparation methods are also described. New methods for in-flight preparation, introduction, and control of the active sorbent into the mercury contaminated gas stream are described.

[0010] In some embodiments, a promoted carbon sorbent is provided comprising a base activated carbon that has reacted with a promoter selected from the group consisting of halides, halogens, and combinations thereof, such that the reaction product is effective for the removal of mercury from a gas stream.

[0011] In an embodiment, a promoted carbon sorbent is provided wherein the base activated carbon is selected from the group consisting of powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, activated carbon with an average particle size greater than that of flyash produced such that it is physically separable therefrom, and combinations thereof, and the promoter is selected from the group consisting of molecular halogens, Group V (CAS nomenclature is used throughout) halides, Group VI halides, hydrohalides, and combinations thereof. In an embodiment, the base activated carbon may have a mass mean particle diameter such that it can be substantially separated by physical means from entrained ash in the gas stream from which mercury is to be removed. In an embodiment, the base activated carbon may have a mass mean particle diameter greater than about 40 micrometers.

[0012] In another embodiment, the sorbent comprises from about 1 to about 30 grams promoter per 100 grams of base activated carbon. Another embodiment further comprises an optional secondary component comprising a halogen or a hydrohalide such that the reactivity and mercury capacity of the sorbent are enhanced.

[0013] In another embodiment, the concentration of the optional secondary component on the finished sorbent is within the range of from about 1 to about 15 wt-% of the concentration of the promoter on the finished sorbent.

[0014] In another embodiment, an optional alkali component may preferably be added to provide a synergistic effect through combination of this alkali with the primary sorbent.

[0015] In another embodiment, the optional secondary component is selected from the group

consisting of Group V halides, Group VI halides, HI, HBr, HCl, and combinations thereof. In another embodiment, the promoter is substantially in vapor form when combined with the base activated carbon. In another embodiment, the promoter is combined with an organic solvent prior to reaction with the base activated carbon. In another embodiment, the promoter and optional secondary component are combined with the base activated carbon substantially simultaneously. Another embodiment further comprises adding a mercury-stabilizing reagent selected from the group consisting of S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof. Another embodiment further comprises adding an optional alkali component.

[0016] In an embodiment, a method is provided comprising providing a granular activated carbon; reacting the activated carbon with a promoter selected from the group consisting of halogens, halides, and combinations thereof, such that the reaction product comprises a promoted carbon sorbent effective for removal of mercury from a gas stream. In a further embodiment, the reaction product comprises from about 1 to about 30 grams promoter per 100 grams activated carbon. In another embodiment the reaction product has an average particle size distribution greater than the average size of entrained ash particles in the gas stream from which mercury is to be removed, such that the reaction product can be substantially removed from the entrained ash particles by physical means. In another embodiment the reaction product has a mass mean particle diameter greater than about 40 micrometers.

[0017] In another embodiment, the promoter is selected from the group consisting of molecular halogens, hydrohalides, Group V halides, Group VI halides, and combinations thereof. In another embodiment the promoter is in the gas phase when contacting the activated carbon. In another embodiment, the promoter is in an organic solvent when contacting the activated carbon.

[0018] In another embodiment, the promoter is selected from the group consisting of Br₂, a Group V bromide, a Group VI bromide, and combinations thereof.

[0019] In another embodiment, the method further comprises reacting the granular activated carbon with an optional secondary component comprising a halogen or a hydrohalide such that the reactivity and mercury capacity of the sorbent are enhanced. In another embodiment, the promoter and optional secondary component are contacted simultaneously with the activated carbon. In another embodiment the method further comprises adding a mercury-stabilizing reagent selected from the group consisting of S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof. In an embodiment, a method is provided for control of mercury in a flue gas with substantially lower sorbent requirements. Through enhanced sorbent reactivity, mercury removal per gram of sorbent is increase, thereby decreasing the capital and operating costs by decreasing sorbent requirements.

[0020] In an embodiment, a method is provided for reducing mercury in flue gas comprising providing a sorbent, injecting the sorbent into a mercury-containing flue gas stream, collecting greater than 70 wt-% of the mercury in the flue gas on the sorbent to produce a cleaned flue gas, and substantially recovering the sorbent from the cleaned flue gas. In embodiments where less than 70 wt-% mercury removal is desired, the required removal may preferably be attained using less than half as much carbon as would be required with standard (non-enhanced) carbon. In a further embodiment, the method further comprises monitoring the mercury content of the clean flue gas, regenerating the recovered sorbent, and using the monitored mercury content of the cleaned flue gas to control the rate of injection of the sorbent. In another embodiment the injected sorbent is prepared in-flight by reacting an activated carbon and a promoter within a pneumatic transport line from which the reaction product is injected to the mercury-containing flue gas stream.

[0021] In another embodiment, the promoter is selected from the group consisting of molecular halogens, halides, and combinations thereof. In another embodiment, the promoter is reacted in the gas phase or as a vapor. In another embodiment, the promoter is added at from about 1 to about 30 grams per 100 grams of activated carbon.

[0022] In another embodiment, the injected sorbent is prepared in-flight by reacting an activated carbon, a promoter, and an optional secondary component to enhance the reactivity and capacity of the sorbent within a pneumatic transport line from which the reaction product is injected to the mercury-containing flue gas stream.

[0023] In another embodiment, the optional secondary component is selected from the group consisting of iodine, hydrohalides, Group V halides, Group VI halides, and combinations thereof. In another embodiment, the optional secondary component is added at from about 1 to about 15 wt-% of the promoter content. In another embodiment, the method further comprises adding to the sorbent a mercury-stabilizing reagent selected from the group consisting of S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

[0024] In an embodiment, the method further comprises co-injecting an optional alkaline material, including without limitation alkaline and alkaline earth components, to improve the efficiency of mercury capture by capturing oxidized mercury and/or capturing gaseous components that might otherwise reduce sorbent capacity. In another embodiment, the optional alkaline material may preferably comprise calcium oxide, sodium carbonate, and the like, as are known in the art.

[0025] In another embodiment, the method further comprises using the monitored mercury content of the cleaned flue gas to control the composition of the sorbent. In another embodiment, the injected sorbent is prepared in-flight by reacting an activated carbon and a promoter within a

pneumatic transport line from which the reaction product is injected to the mercury-containing flue gas stream, wherein the promoter is selected from the group consisting of molecular halogens, halides, and combinations thereof, wherein the promoter is reacted in the gas phase or as a vapor, wherein the promoter is added at from about 1 to about 30 grams per 100 grams of activated carbon, wherein the rate at which the promoter is added and the rate of sorbent injection are determined by a digital computer based at least in part on the monitored mercury content of the cleaned flue gas.

[0026] In an embodiment, a method for reducing the mercury content of a mercury and ash containing gas stream is provided wherein particulate activated carbon sorbent with a mass mean size greater than 40 μm is injected into the gas stream, mercury is removed from the gas by the sorbent particles, the sorbent particles are separated from the ash particles on the basis of size, and the sorbent particles are re-injected to the gas stream. In another embodiment, the mercury-containing sorbent particles are regenerated to remove some or substantially all of the mercury. In another embodiment, an alkaline component is co-injected into the gas stream. In another embodiment, the sorbent may further comprise a promoter. The promoter may preferably comprise a halide, a halogen, or both.

[0027] As will be described in more detail below, the present invention thus provides several advantages over previously known techniques, including significantly more effective and economical mercury sorbents for effluent gases, advantageously applicable to treating gas streams from fired equipment and gasification systems.

[0028] The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter that form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and specific embodiments disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] For a more detailed description of the preferred embodiments of the present invention, reference will now be made to the accompanying drawings.

[0030] Figure 1 schematically illustrates methods for preparation of promoted carbon sorbents in accordance with the present invention.

[0031] Figure 2 illustrates a proposed mechanistic model of the chemical reactions resulting in the oxidation and capture of mercury.

[0032] Figure 3 schematically illustrates preparation of promoted carbon sorbents and processes for flue gas mercury reduction in flue gases and/or product gases from a gasification system in accordance with the present invention, including in-flight preparation of promoted carbon sorbent.

[0033] Figure 4 is a diagram illustrating breakthrough curves for 5 wt/wt% brominated NORIT Darco FGD sorbent (37 mg + 113 mg sand) in low-HCl (1 ppm) synthetic flue gas.

[0034] Figure 5 is a diagram illustrating breakthrough curves for non-halogenated NORIT Darco FGD sorbent (37 mg + 113 mg sand) in low-HCl (1 ppm) synthetic flue gas.

[0035] Figure 6 is a bar chart illustrating pilot-scale mercury removal results, including large-size sorbent results.

[0036] Figure 7 is a diagram illustrating the effects of sorbent size and injection rate on mercury removal for ESPs and fabric filters.

[0037] Figure 8 is a diagram illustrating the breakthrough curves for a brominated NORIT Darco FGD sorbent with inert sand.

[0038] Figure 9 is a diagram illustrating the breakthrough curves for brominated NORIT Darco FGD sorbent with a co-injected alkali material.

[0039] Figure 10 is a plot of mercury removal vs. carbon injection rate with and without co-injection of alkali material.

DETAILED DESCRIPTION

[0040] Herein will be described in detail specific preferred embodiments of the present invention, with the understanding that the present disclosure is to be considered an exemplification of the principles of the invention, and is not intended to limit the invention to that illustrated and described herein. The present invention is susceptible to preferred embodiments of different forms or order and should not be interpreted to be limited to the specifically expressed methods or compositions contained herein. In particular, various preferred embodiments of the present invention provide a number of different configurations and applications of the inventive method, compositions, and their uses.

[0041] The present invention provides a cost-effective way to capture pollutants by utilizing exceptionally reactive halogen/halide promoted carbon sorbents using a bromide (or other halogen/halide) treatment of the carbon, that capture mercury *via* mercury-sorbent surface reactions,

at very short contact times of seconds or less. The sorbent does not require *in situ* activation (no induction period) in the gas stream to achieve high reactivity, as do conventional activated carbon sorbents. The reactivity of the sorbent toward the pollutants is greatly enhanced and the sorption capacity can be regenerated, the promoted sorbent may be regenerated, recycled and/or reused.

[0042] The treated carbons, treatment techniques, and optional additives discussed herein have applicability to mercury control from the product or effluent gas or gases from gasification systems, syngas generators, and other mercury-containing gas streams, in addition to the flue gas from combustion systems. Thus, it should be understood that the terms combustion system and flue gas as used throughout this description may apply equally to gasification systems and syngas or fuel gas, as will be understood by those skilled in the art.

[0043] Referring now to Figure 1, there is shown a block flow diagram illustrating some preferred embodiments of the process of the present invention to prepare promoted sorbents useful for mercury capture from flue gas and/or product gas from a gasification system streams. In a preferred embodiment illustrated by path 10-20, block 10 illustrates providing a base activated carbon, and adding a halogen or halide promoter that reacts with the carbon, illustrated at block 20, to produce a product promoted carbon sorbent. In embodiments where the halogen or halide is added, for example, as a vapor, no further steps may be necessary. In embodiments where the halogen or halide is added in, for example, a solvent, it may be desirable to employ solvent removal as illustrated by block 20A.

[0044] Referring still to Figure 1, another preferred embodiment of the process of the present invention is illustrated by path 10-20-30, comprising providing a base activated carbon as shown by block 10, adding a halogen or halide promoter that reacts with the carbon, illustrated at block 20, and adding a secondary component illustrated at block 30 that reacts with the result of block 20 to produce a product promoted carbon sorbent. In embodiments where both the halogen or halide promoter and the secondary component are added, for example, as a vapor, no further steps may be necessary. In embodiments where the halogen or halide promoter and/or secondary component are added in, for example, a solvent, it may be desirable to employ solvent removal as illustrated by block 30A.

[0045] Referring still to Figure 1, another preferred embodiment of the process of the present invention is illustrated by path 10-40, comprising providing a base activated carbon as illustrated at block 10, and adding a halogen or halide promoter and a secondary component to the activated carbon together, with which they react as illustrated by block 40, producing a product promoted carbon sorbent. As above, in embodiments where vapor additions are made to the activated carbon

no further steps may be desired. In embodiments where one or more components are added in solvent, a solvent removal step may be provided as illustrated by block 40A.

[0046] Referring still to Figure 1, also illustrated are preferred embodiments in which, as illustrated by block 50, a flue gas stream is treated with product promoted carbon sorbent prepared as described above.

[0047] In some preferred embodiments the activated carbon provided may preferably be any of several types, as understood by those skilled in the art. For example, the activated carbon may include powdered activated carbon, granular activated carbon, carbon black, carbon fiber, carbon honeycomb or plate structure, aerogel carbon film, pyrolysis char, regenerated activated carbon from product promoted carbon sorbent, or other types as known in the art.

[0048] In some preferred embodiments the activated carbon provided may preferably be any of several types, as understood by those skilled in the art. For example, the activated carbon may include powdered activated carbon, granular activated carbon, carbon black, carbon fiber, carbon honeycomb or plate structure, aerogel carbon film, pyrolysis char, an activated carbon or regenerated activated carbon with a mass mean particle size greater than fly ash in a flue gas stream to be treated.

[0049] In some preferred embodiments the activated carbon provided may preferably be any of several types, as understood by those skilled in the art. For example, the activated carbon may include powdered activated carbon, granular activated carbon, carbon black, carbon fiber, carbon honeycomb or plate structure, aerogel carbon film, pyrolysis char, an activated carbon or regenerated activated carbon with a mass mean particle diameter preferably greater than 40 micrometers, more preferably greater than 60 micrometers, or a particle size distribution greater than that of the fly ash or entrained ash in a flue gas stream to be treated, such that the activated carbon and ash can be separated by physical means.

[0050] In some preferred embodiments, the halogen or halide promoter that is added to, and reacts with, the base activated carbon may preferably comprise, by way of illustration and not limitation, a molecular halogen in vapor or gaseous form, a molecular halogen in an organic solvent, a Group V or Group VI halide, such as PBr_3 or SCl_2 , respectively, in vapor, liquid, or solution form (though not in an aqueous solvent).

[0051] Embodiments are also provided in which the organic solvent may preferably comprise a chlorinated hydrocarbon, such as dichloromethane, a hydrocarbon solvent, including for example, petroleum ether, ligroin, pentane, hexane, toluene, and benzene, carbon disulfide, a waste solvent, an ether, a recycled solvent, a supercritical solvent, such as supercritical CO_2 , water (though not in the case of a Group V or Group VI halide), and others as will be apparent to those of skill in the art.

[0052] Referring now to Figure 2, there is illustrated a theory developed from scientific evidence to explain the nature of the promoting compounds. For example, as illustrated in Figure 2, hydrogen bromide reacts with the unsaturated structure of the activated carbon. This may be, by way of illustration only, a carbene species on the edge of the graphene sheet structures of the carbon. Molecular bromine or a bromine compound reacts to form a similar structure, with a positive carbon that is active for oxidizing the mercury with subsequent capture by the sorbent.

[0053] It has now been found that the formation of the new bromide compound with carbon increases their reactivity toward mercury and other pollutants. Additionally, the resulting bromide compound is uniquely suited to facilitate oxidation of the mercury. The effectiveness of the oxidation apparently results from the promotion effect of the halide, exerted on the developing positive charge on the mercury during the oxidation, known in the chemical art as a specific catalytic effect. Thus, as the mercury electrons are drawn toward the positive carbon, the halide anion electrons are pushing in from the other side, stabilizing the positive charge developing on the mercury and lowering the energy requirement for the oxidation process. Bromide is especially reactive, owing to the highly polarizable electrons in the outer 4p orbitals of the ion. Thus, adding HBr or Br₂ to the carbon forms a similar carbon bromide, in which the positive carbon oxidizes the mercury with the assistance of the bromide ion.

[0054] Referring now to Figure 3, a schematic flow diagram is provided of mercury control system 100 comprising preparation of promoted carbon sorbents, and flue gas mercury reduction, in accordance with preferred embodiments of the present invention. There is provided base activated carbon reservoir 110, an optional halogen/halide promoter reservoir 120, an optional secondary component reservoir 130, and an optional alkali component reservoir 180, each of which with corresponding flow control device(s) 201, 202, 203, and 208/209, respectively. In conjunction with the optional alkali component reservoir 180, optional flow control devices 208 and 209 can be used independently, together, or not at all.

[0055] Reservoirs 110, 120, 130, and 180 connect through their respective flow control devices and via associated piping, to transport line 115. Optional alkali component reservoir 180 may also connect, through respective flow control devices and via associated piping, to transport line 118. A source of air, nitrogen, or other transport gas(es) is provided by gas source 170 to transport line 115 for the purpose of entraining materials discharged from reservoirs 110, 120, 130, and 180 and injecting such materials, via injection point 116, into contaminated flue gas stream 15. A source of air, nitrogen, or other transport gas(es) may be provided by gas source 171 to transport line 118 for the purpose of entraining materials discharged from reservoirs 180 and injecting such materials, via

injection point 119, into flue gas stream 15. Gas sources 170 and 171 may be the same or different, as desired. Alternatively, transport gas(es) may be provided to *both* transport lines 115 and 118 by gas source 170 (connection from source 170 to line 118 not shown). Although gas sources 170 and 171 are shown in Figure 3 as compressors or blowers, any source of transport energy known in the art may be acceptable, as will be appreciated by those of skill in the art.

[0056] For clarity, single injection points 116 or 119 are shown in Figure 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention. Optical density measuring device (s) 204 is connected to transport line 115 and/or 118 to provide signals representative of the optical density inside transport line 115 and/or 118 as a function of time.

[0057] Downstream from injection point 116 and 119 is provided particulate separator 140. By way of illustration and not limitation, particulate separator 140 may comprise one or more fabric filters, one or more electrostatic precipitators (hereinafter “ESP”), or other particulate removal devices as are known in the art. It should be further noted that more than one particulate separator 140 may exist, sequentially or in parallel, and that injection point 116 and 119 may be at a location upstream and/or downstream of 140 when parallel, sequential, or combinations thereof exist. Particulate separator 140 produces at least a predominantly gaseous (“clean”) stream 142, and a stream 141 comprising separated solid materials. A sorbent/ash separator 150 separates stream 141 into a largely ash stream 152, and a largely sorbent stream 151. Stream 151 may then preferably be passed to an optional sorbent regenerator 160, which yields a regenerated sorbent stream 161 and a waste stream 162.

[0058] An optional Continuous Emission Monitor (hereinafter “CEM”) 205 for mercury is provided in exhaust gas stream 35, to provide electrical signals representative of the mercury concentration in exhaust stream 35 as a function of time. The optional mercury CEM 205 and flow controllers 201, 202, 203, 208, and 209 are electrically connected via optional lines 207 (or wirelessly) to an optional digital computer (or controller) 206, which receives and processes signals and preferably controls the preparation and injection of promoted carbon sorbent into contaminated flue gas stream 15.

[0059] In operation, promoted carbon sorbent and/or an optional alkali component is injected into contaminated flue gas stream 15. After contacting the injected material with the contaminated flue gas stream 15, the injected material reduces the mercury concentration, transforming contaminated flue gas into reduced mercury flue gas, 25. The injected material is removed from the flue gas 25, by separator 140, disposed of or further separated by optional separator 150, and disposed of or regenerated by an optional regenerator 160, respectively. The reduced mercury “clean” flue gas stream 142 is then monitored for mercury content by an optional CEM 205, which provides

corresponding signals to an optional computer/controller 206. Logic and optimization signals from 206 then adjust flow controllers 201, 202, 203, 208, 209 to maintain the mercury concentration in exhaust stream 35 within desired limits, according to control algorithms well known in the art. Flow controllers 201, 202, 203, 208, 209 can also be adjusted manually or be some other automated means to maintain the mercury concentration in exhaust stream 35 within desired limits, according to control algorithms well known in the art.

[0060] Referring still to Figure 3, there are illustrated several preferred embodiments for preparation and injection of promoted carbon sorbents and/or alkali components in accordance with the present invention. Stream 111 provides for introduction of base activated carbon from reservoir 110, as metered by flow controller 201 manually or under the direction of computer 206. The halogen/halide may be combined and react with the base activated carbon according to any of several provided methods. The halogen/halide may preferably be combined via line 121 directly into transport line 115, within which it contacts and reacts with the base activated carbon prior to injection point 116. This option is one form of what is referred to herein as “in-flight” preparation of a promoted carbon sorbent in accordance with the invention. Further, the halogen/halide may be combined via line 121b with base activated carbon prior to entering transport line 115. Still further, the halogen/halide may be contacted and react with the base activated carbon by introduction via line 121c into reservoir 110. This option is preferably employed when, for example, reservoir 110 comprises an ebulliated or fluidized bed of base activated carbon, through which halogen/halide flows in gaseous form or as a vapor. Of course, the halogen/halide may also preferably be contacted with the base activated carbon in liquid form or in a solvent, as discussed previously, and solvent removal (not shown in Figure 3) may then be provided if necessary as mentioned with respect to embodiments discussed with reference to Figure 1.

[0061] Similarly, the optional secondary component may be contacted and react directly in transport line 115 via line 131, or optionally as described above with respect to the halogen/halide, via lines 131b and 131c.

[0062] Similarly, the optional alkali component from 180 may either be added in transport line 115 directly, or may be injected separately by transport line 118, combining downstream in flue gas 15 for synergistic effects with base activated carbon, promoted carbon, or optional secondary components. Being able to vary onsite the amount of the optional alkali component relative to base activated carbon, promoted carbon, or optional secondary components is a key feature to overcome and optimize for site-specific operating and flue gas conditions..

[0063] In some preferred embodiments wherein contacting between components and reaction is performed in a liquid or solvent phase, stirring of such liquid and/or slurry mixtures may be provided. In other embodiments, the halogen/halide promoter and optional secondary component(s) may preferably be sprayed in solution form into or on the base activated carbon. In some such embodiments, drying, filtering, centrifugation, settling, decantation, or other solvent removal methods as are known in the art may then be provided.

[0064] In embodiments wherein the halogen/halide promoter is in gaseous or vapor form, it may be diluted in air, nitrogen, or other gas as appropriate. The halide/halogen gas, for example, gaseous HBr or Br₂, may be passed through an ebulliated or fluidized bed of granular or fibrous activated carbon, with the promoted carbon sorbent so produced removed from the top of the bed via gas entrainment for injection.

[0065] In some embodiments, the secondary component(s) may preferably comprise iodine or other halogens, hydrohalides, including without limitation HI, HBr, HCl, a Group V or Group VI element with a molecular halogen, such as SCl₂ and others. In some preferred embodiments, the promoted carbon sorbent may comprise from about 1 to about 30 g halogen/halide per 100 g base activated carbon. In some preferred embodiments, the promoted carbon sorbent may comprise an secondary component in concentration of from about 1 to about 15 wt-% of the concentration of the halogen/halide component.

[0066] In still other embodiments, the product promoted carbon sorbent may be applied to a substrate. In other embodiments, such prepared substrate(s) may be caused to contact a contaminated flue gas or gasification system product gas stream for mercury reduction purposes. Such substrates may be monolithic, rotating, or exposed to the gas stream in any number of ways known to those skilled in the art.

[0067] In some embodiments, a method is provided whereby a mercury stabilizing reagent is added to a promoted carbon sorbent to produce a bifunctional sorbent. Such stabilizing reagent(s) may be sequentially added, either before or after the addition and reaction of the halogen/halide. In some preferred embodiments, the halogen/halide preferably comprises Br or HBr, and the mercury-stabilizing reagent may comprise S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

Halogens in Mercury Capture

[0068] Methodologies for using halogens for the treatment of flue gas have been problematic, owing to their reactivity with other gases and metals, resulting in corrosion and health issues. A "halogen" is defined as a member of the very active elements comprising Group VIIA (CAS nomenclature is used throughout; Group VIIA (CAS) corresponds to Group VIIB (IUPAC)) of the periodic table. In

the molecular elemental form of the halogens, including F₂, Cl₂, Br₂, and I₂, the reaction with a hot flue gas components leave little to react with elemental mercury. The atomic elemental halogen form, which includes the fluorine, chlorine, bromine, and iodine atoms, is about a million times more reactive to mercury but the concentration of the atomic forms is typically extremely low. In a large portion of electric utility coal combustion facilities, the concentrations are generally not sufficient to oxidize a significant amount of mercury.

[0069] The term “halide” as used herein is defined as a compound formed from the reaction of a halogen with another element or radical. In general, halide compounds are much less reactive than the molecular halogens, having a low chemical potential. Halides are considered reduced forms that do not, alone, oxidize other compounds. In the conventional view therefore, a halide-salt-treated activated carbon will not effectively oxidize elemental mercury and capture elemental mercury.

Halogen Promoted Sorbent Characteristics

[0070] The sorbent described here has a very high initial reactivity for oxidizing mercury and therefore can be used in very small amounts to achieve very high capture efficiencies, thus lowering operation costs and lessening waste disposal problems. In addition, further disposal reductions are obtainable by regenerating and reusing the sorbents produced using the inventive technology. The time interval required for the mercury and the promoted carbon sorbents of the present invention to successfully interact in a flue gas duct, with the subsequent collection of the mercury on the sorbent and ash is very short – less than seconds. Clearly, such collection times require the sorbent to have both high capacity and high reactivity toward mercury. The promoted carbon sorbent can be utilized in a very finely powdered form to minimize mass transfer limitations. However, again, the reactivity should be very high to capture all of the mercury encountered by the fine particles. Additionally, use of these enhancement technologies allows capture to be effective for larger sorbent particles which also allows separation of the sorbent from the ash to enable subsequent regeneration as well as ash utilization. One feature of this invention is the process to prepare a sorbent containing a halide compound formed on the carbon structure that provides a sorbent that is highly active on initial contact with the mercury contaminated gas stream, which allows for very effective capture of the mercury.

[0071] It appears that the inventive sorbents chemically combine molecular bromine, for example, from solution, with activated carbon (edge sites). X-ray photoelectron spectroscopy has established that the addition of bromine, chlorine, HBr, or HCl formed a chemical compound in the carbon structure. Thus, the sorbent produced from halogen and activated carbon does not represent a molecular halogen form, but rather a new chemically modified carbon (or halocarbon) structure.

This phenomenon may not occur with the less reactive iodine, where an I₂ molecular complex can exist on the carbon basal plane. In the case of bromine, modified cationic carbon has a high chemical potential for oxidation of mercury. Thus, an entirely new model is presented for the reactivity of the bromine-treated carbon with mercury. The reactive carbon form can preferably be generated by the addition of bromine, hydrogen bromide, or combinations of bromine and other elements, as described herein. Halogen treatment resulted in higher-activity carbons because the halide anions (especially bromide and iodide) were effective in promoting the oxidation by stabilizing the developing positive charge on the mercury in the transition state for oxidation. Based on this model, several innovative, inexpensive, activity-enhancing features have been developed.

Optional Second Component

[0072] It has been demonstrated that addition of an optional second component, in addition to the bromine, results in improved reactivity and capacity for the sorbent, typically exceeding that of both the untreated carbon and the brominated carbon. The second compound comprises either a second halogen or a compound derived from a second halogen, such as HI. Thus, in addition to having a reactive carbon form present, the second component generates a Lewis base with greater ability to stabilize the developing positive charge on the mercury. Thus, the second component is an element with more polarized electrons (4p and 5p).

Optional Alkali Component

[0073] It has been demonstrated that addition of an optional alkali component with a base or promoted activated carbon results in improved mercury capture, typically exceeding that of both the untreated carbon and the promoted carbon. Test data indicate that flue gas contaminants, flue gas constituents (SO₂, NO_x, HCl, etc), operating temperature, mercury form, and mercury concentration may impact the effectiveness of the alkali addition. This suggests the need to be able to adjust and tailor the alkali-to-activated-carbon ratio onsite in order to overcome and optimize for a given set of site conditions.

[0074] The synergy that can be gained when co-injecting the two materials can be explained as follows. First, testing shows that binding sites on activated carbon (hereinafter "AC") can be consumed by chlorine species, sulfur species (i.e. sulfates), and other flue gas contaminants (arsenates, selenates, etc). The addition of optional alkali material will interact and react with these species/contaminants thus minimizing their consumption of AC mercury binding sites. Second, testing also shows that standard AC will continue to oxidize mercury, even though the binding sites are fully consumed. This oxidized mercury can then react with alkali material and subsequently be captured by particulate control devices. Consequently, the addition of the optional alkali component

acts to protect mercury binding sites and capture oxidized mercury, thereby resulting in improved mercury reduction at lower cost. Alkali is generally much lower in cost (~ an order of magnitude less) than activated carbon, thus more of it can be used still resulting in overall lower costs.

“In-Flight” Sorbent Preparation

[0075] Furthermore, we have demonstrated that the halogen promoted carbon sorbent can be readily produced “in-flight”. This is accomplished by, for example, contacting the vapors of any combination of halogens and optionally a second component, in-flight, with very fine carbon particles. The particles may be dispersed in a stream of transport air (or other gas), which also conveys the halogen/halide promoted carbon sorbent particles to the flue gas duct, or other contaminated gas stream, from which mercury is to then be removed. There is no particular temperature requirement for this contact. This technology is obviously very simple to implement, and results in a great cost savings to facilities using this technology for mercury capture.

Advantages of On-Site Preparation

[0076] In-flight preparation of the halogen/halide promoted carbon sorbent on location produces certain advantages. For example, the treatment system can be combined with the carbon injection system at the end-use site. With this technique, the halogen/halide is introduced to the carbon-air (or other gas) mixture in a transport line (or other part of the sorbent storage and injection system). This provides the following benefits over current conventional concepts for treating sorbents off-site:

- Capital equipment costs at a treatment facility are eliminated.
- Costs to operate the treatment facility are eliminated.
- There are no costs for transporting carbon and additive to a treatment facility.
- The inventive process uses existing hardware and operation procedures.
- The inventive technology ensures that the sorbent is always fresh, and thus, more reactive.
- No new handling concerns are introduced.
- There are no costs for removing carbon from treatment system.
- The inventive process allows rapid on-site tailoring of additive-sorbent ratios in order to match the requirements of flue gas changes, such as may be needed when changing fuels or reducing loads, thus further optimizing the economics.
- The inventive technology reduces the amount of spent sorbents that are disposed.

[0077] With the foregoing and other features in view, there is provided, in accordance with the present invention, embodiments including a process for preparing and regenerating halogen/halide promoted carbon sorbents, whose activity for mercury capture is enhanced by the addition of halogen (e.g. bromine) to the carbon structure.

Sorbent Injection Location

[0078] Some of the preferred embodiments contemplate the use of a halogen promoted sorbent in a powdered form that has been injected into a flue gas stream before or after ash particulates have been removed. Other embodiments of the inventive composition of the halogen promoted carbon sorbent comprise a powdered modified activated carbon prepared by adding Br₂ or HBr plus a second optional component. Other embodiments allow the addition of the optional alkali component in conjunction with a base activated carbon and/or with the use of a halogen based sorbent and any other combinations of the sorbent technologies provided in this patent. Alternatively, embodiments include methods wherein the sorbent is on a moving contactor consisting of particles or fibers containing one or more of the compositions listed above.

Sorbent Regeneration

[0079] Any of the above embodiments of the halogen/halide promoted carbon sorbent can be easily regenerated; the poisoning contaminants from the flue gas are preferably removed and an inexpensive promoting agent added, to restore mercury sorption activity. This process of promoting the activity of the carbon itself contrasts with the earlier, more expensive, conventional methods of adding a reagent (such as peroxide, gold, triiodide, etc.) to a sorbent. The halogen/halide promoted carbon sorbent of the present invention, treated with bromine and/or optional components, is noncorrosive. Detailed examples of sorbent regeneration techniques are described in co-pending, commonly owned PCT patent application No. PCT/US04/12828, titled "PROCESS FOR REGENERATING A SPENT SORBENT", which is hereby incorporated by reference in its entirety.

Sorbent Injection Control Schemes

[0080] Another advantage of the present invention relates to the use of a feedback system to more efficiently utilize certain aspects of the invention. Where possible and desirable, the mercury control technology of the present invention may preferably utilize continuous measurement of mercury emissions as feedback to assist in control of the sorbent injection rate. Tighter control on the sorbent and optional component(s) levels can be achieved in this way, which will ensure mercury removal requirements are met with minimal material requirements, thus minimizing the associated costs. In an embodiment, the mercury emissions are continuously measured downstream of the injection location, preferably in the exhaust gas at the stack.

Promoted Carbon Sorbents

[0081] Reactions of halogens and acidic species with the basic binding sites on the activated carbon sorbent create sites for oxidizing mercury. Other metal ions, such as boron, tin, arsenic, gallium, Sb,

Pb, Bi, Cd, Ag, Cu, Zn, or other contaminants, will also react with the oxidation sites generated on the carbon.

[0082] According to our model, adding the bromine from the bromine reagent or a proton from a hydrogen halide acid to a basic carbene site on the carbon edge structure forms a *carbocation* that accepts electrons from the neutral mercury atom forming the oxidized mercury species that is bound to the sorbent surface. The reactive site may also generate reactive bromine radicals or carbon radicals at the active sites on the carbon. Thus, the activated carbon serves to stabilize the bromine, yet provides a highly reactive bromine- containing reagent that can oxidize the mercury and promote its capture on the activated carbon. The sorbent that contains bromine is expected to be more reactive than the corresponding sorbent containing chlorine and much less expensive than the sorbent containing iodine.

EXAMPLES

[0083] To more clearly illustrate the present invention, several examples are presented below. These examples are intended to be illustrative and no limitations to the present invention should be drawn or inferred from the examples presented herein.

Example 1 -Preparation and Testing of Halogenated Carbon (& Comparative Example)

Gas Phase Halogenation

[0084] Finely powdered activated carbon (such as NORIT Darco FGD, NORIT Americas, Inc., Marshall, TX (USA), although others are suitable, as will be recognized by those skilled in the art), was placed in a rotating plastic barrel with side blades (a 5 ft³ (0.14 m³) cement mixer) fitted with a tight plastic lid to prevent loss of the fine powder during the preparation. In a separate vessel, gas phase bromine was generated by passing a nitrogen stream over a weighed amount of liquid bromine that is warmed to about 40°–50°C. The vapor pressure of the bromine was such that a dark red gas is generated and passed out of the generator. The outlet from the gaseous bromine generator is connected via a ¼ inch (0.64 cm) plastic hose to a stationary metal tube inserted through a flange in the center of the plastic lid and passing into the center of the barrel. The flange is not air tight so that the excess of nitrogen is released after the bromine is transferred to the tumbling carbon. Thus, the bromine gas stream continuously passed into the rotating barrel where it contacted the tumbling carbon. The unit is then operated until the desired amount of bromine has combined with the carbon. Typically, this is 0.4 to 1 kg of bromine to 20 kg of carbon (2–5 wt. %). When the reaction is

completed, the carbon is weighed. The treated carbon is odorless and does not cause skin irritation since the bromine has completely reacted with the carbon to produce the brominated carbon.

[0085] XPS spectra demonstrate that the brominated carbon contains both covalent carbon-bound (organic) bromide as well as anionic bromide. The product contains the same moisture originally present in the activated carbon (5–17 wt%), but does not require further drying for use. The moisture is driven out at higher temperatures (>150°C), and the bromine was not released until very high temperatures

Bench-Scale Testing of Mercury Oxidation and Capture Efficiency

[0086] A bench-scale apparatus and procedure based on the above description was used to test the initial activities and capacities of several promoted activated carbon sorbents using powdered carbon, including bromine-containing activated carbons prepared from a variety of carbons, including commercially available sorbents, aerogel film sorbents, and the original precursor carbons for comparison.

[0087] A detailed description of the apparatus and its operation is provided in Dunham, G.E.; Miller, S.J. Chang, R.; Bergman, P. *Environmental Progress* **1998**, *17*, 203, which is incorporated herein by reference in its entirety. The bench scale mercury sorbent tests in the flue gas compositions were performed with finely (-400 mesh) powdered sorbents (37 mg) mixed with 113 mg sand and loaded on a quartz filter (2.5 inch (6.35 cm)). The loaded filter and holder were heated in an oven (125°C) in the simulated flue gas stream (30 SCFH (standard cubic feet/hr) or 0.79 NCMH (normal cubic meters per hour)) containing the following: O₂ (6%), CO₂ (12%), SO₂ (600 ppm), NO (120 ppm) NO₂ (6 ppm), HCl (1 ppm), Hg⁰ (11 µg/m³), H₂O (15%), and N₂ (balance). Elemental mercury was provided by a standard permeation tube source placed in a double jacketed glass condenser, and heated to the desired temperature. Mercury concentrations in the gas streams were determined with a continuous mercury emission monitor (Sir Galahad mercury CEM mfr. P.S. Analytical Deerfield Beach FL USA), and a SnCl₂ cell was used to convert oxidized species to elemental, so that both elemental and oxidized mercury concentration data could be obtained for both the influent and the effluent concentrations from the sorbent bed. Mercury concentrations were calibrated for the flow rates used. Spent sorbents were analyzed for mercury to determine the mass balance.

[0088] Referring now to Figure 4, the effluent mercury concentration data are plotted as a percent of the influent mercury versus time. The resulting curve (breakthrough curve) for the halogenated sorbents typically showed 0%–1% Hg in the effluent (99+% capture) at the beginning, and increasing only after 30–60 minutes (breakthrough point), depending on the sorbent. Figure 4 illustrates the breakthrough curves for 5 wt/wt% brominated NORIT Darco FGD sorbent (37 mg + 113 mg sand)

with synthetic flue gas containing 1 ppm HCl. Total Hg (solid circles) and elemental Hg (solid squares) in the effluent are presented as a per cent of the inlet Hg. "EOT" indicates the end of test (the later data points shown are for calibration checks).

[0089] Figure 5 presents the comparative breakthrough curves for the corresponding nonhalogenated sorbents typically initiated at 5%–50% of inlet mercury, depending on the HCl concentration in the synthetic flue gas, thus indicating considerably lower reactivity for oxidation and capture of the mercury for the nonhalogenated sorbents. After breakthrough of either halogenated or nonhalogenated sorbent, most of the mercury in the effluent was oxidized mercury.

Example 2 - Gas Phase Halogenation of Fluidized Carbon

[0090] A bed of activated carbon supported in a vertical tube by a plug of glass wool was fluidized by a nitrogen stream. The top of the fluidized bed tube was connected to a catching trap for carbon fines that blow out the top of the tube. The bromine gas generator as described in Example 1 was attached to the fluidized carbon bed and the desired amount of gaseous bromine was passed into the bed. The contents of the trap were then mixed with the material in the bed and weighed. The resulting brominated carbon exhibited properties similar to the brominated carbon of Example 1.

Example 3 - Liquid Phase (water) Halogenation

[0091] A 5% solution of bromine in water was prepared by carefully adding 50 g of bromine to 1 liter of cold water. One kg of activated carbon was added to the bromine solution in a large metal can. The resulting slurry was stirred with a large paddle during the addition and for a short time afterwards until all the bromine had reacted with the carbon, as indicated by the disappearance of the red color. The slurry was then filtered using a Buchner funnel under vacuum. The moist carbon that was collected on the filter was dried in an oven at 110°C for several hours to constant weight. As in Example 1, some moisture remains in the carbon, however. The dried carbon was then tumbled in the rotating barrel with metal pieces to break up and fluff the carbon.

Example 4 - Addition of the Optional Second Halide Component.

[0092] Brominated carbon was produced by solution phase bromination similar to that described with reference to Example 3. However, before filtration, a solution of hydriodic acid (HI) was added to the slurry in an amount equal to 10% of the bromine amount. The slurry was stirred to complete the reaction and then filtered and dried as described in Example 3.

Example 5 - Liquid Phase Phosphohalogenation

[0093] A solution of phosphorus tribromide (500 g) in ligroin (10 liters) was stirred in a large metal can and 10 kg of activated carbon was added. The resulting slurry was stirred with a large paddle at ambient temperature to complete the reaction. The slurry was filtered under vacuum on a large

Buchner funnel in several batches. The wet filter cake was dried at 110°C in an oven to constant weight. The dried product was fluffed in the rotating barrel as described in Example 3.

Example 6 - Preparation and Sorption on Larger-Particle Carbon

[0094] Tests were conducted on a pilot-scale combustor while firing a subbituminous coal, to evaluate mercury control by injecting larger-than-normal sized treated activated carbon. Standard AC sorbents generally are of fine size with a mean particle diameter of less than 20 micrometers, which is also typical of the flyash that is generated from pulverized coal combustion. Consequently, because the sizes of standard AC and flyash are similar, separation of the two is difficult. Injection of larger sized AC is generally not considered because the sorbent effectiveness decreases with size. In a scheme to recycle the injected carbon, the carbon is separated from the flyash. A separation based on size fractionation requires a treated larger particle sorbent. To test this concept, a treated larger sized (>60 µm) sorbent was developed, prepared, and tested.

Treatment - Gas Phase Halogenation

[0095] Granular activated carbon (Calgon F400) was ground and sieved through conventional mesh screens. The mesh size fraction -170 to +240 (corresponding to about 60 to about 88 micrometers) was collected and placed in a rotating vessel as described in Example 1 above. In a separate vessel, gas phase bromine was generated by passing a nitrogen stream over a weighed amount of liquid bromine that was warmed to about 40°–50°C, and the outlet from this gaseous bromine generator was connected via a 1/4 inch (6.35 mm) plastic hose to a stationary metal tube inserted through a flange in the center of the lid and passing into the center of the rotating vessel, also as described in Example 1. The unit was operated until the desired amount of bromine had combined with the carbon, in this case 0.05 kg of bromine to 1 kg of carbon (5 wt. %). When the reaction was completed, the carbon was weighed. The treated carbon was odorless as has been described above.

PTC Apparatus

[0096] The pilot-scale combustor, known as the “Particulate Test Combustor” (hereinafter “PTC”), is a 550,000-Btu/hr (about 161 kW) pulverized coal (“PC”)-fired unit, designed to generate combustion flue gas properties and fly ash that are representative of those produced in a full-scale utility boiler. The combustor is oriented vertically to minimize wall deposits. A refractory lining helps to ensure adequate flame temperature for complete combustion and prevents rapid quenching of the coalescing or condensing fly ash. Based on the superficial gas velocity, the mean residence time of a particle in the combustor is approximately 3 seconds. The coal nozzle of the PTC fires axially upward from the bottom of the combustor, and secondary air is introduced concentrically to

the primary air with turbulent mixing. Coal is introduced to the primary air stream via a screw feeder and eductor. An electric air preheater is used for precise control of the combustion air temperature. Originally, the PTC used cold-water annular heat exchangers to provide flue gas temperature control to the baghouse (also referred to as a "fabric filter") or electrostatic precipitator (ESP). However, analysis of ash deposits collected from the heat exchangers indicated that some mercury was collected on the duct walls. To minimize this effect, the heat exchangers were modified to provide for higher duct wall temperatures.

[0097] The PTC instrumentation permits system temperatures, pressures, flow rates, flue gas constituent concentrations, and particulate control device (baghouse, Advanced Hybrid Particle Collector/AHPCTM, and/or electrostatic precipitator/ESP) operating data to be monitored continuously and recorded on a data logger.

PTC Procedure

[0098] Flue gas samples were taken at combinations of two of the three available system sample points: the furnace exit, the particulate control device inlet, and the particulate control device outlet. After passing through sample conditioners to remove moisture, the flue gas was typically analyzed for O₂, CO, CO₂, SO₂, and NO_x. Each constituent was normally analyzed at both the furnace exit and the outlet of the particulate control device simultaneously, using two analyzers. The concentration values from all of the instruments were recorded continuously. In addition, data were manually recorded at set time intervals. NO_x was determined using a pair of Rosemount Analytical NO_x chemiluminescent analyzers. SO₂ was measured using a pair of Ametek Instruments photometric gas analyzers. The remaining gases were measured by a pair of Rosemount Analytical multi-gas continuous emissions monitors. Each of these analyzers was regularly calibrated and maintained to provide accurate flue gas concentration measurements.

[0099] The baghouse vessel was a 20 inch (50.8 cm) (ID) chamber that is heat-traced and insulated, with the flue gas introduced near the bottom. The combustor produced about 200 ACFM (actual cubic feet per minute; about 5.7 actual m³/min) of flue gas at 300°F (about 150°C), therefore three 13-ft by 5-inch (3.96 m by 12.7 cm) bags provided an air-to-cloth ratio of 4 ft/min (1.22 m/min). Each bag was cleaned separately in operation with its own diaphragm pulse valve. In order to quantify differences in pressure drop for different test conditions, the bags were cleaned on a time basis, rather than with the cleaning cycle initiated by pressure drop. Once bag cleaning was initiated, all three bags were pulsed in rapid succession on-line.

[00100] Tests were also conducted with a single-wire, tubular ESP replacing the fabric filter. The ESP unit was designed to provide a specific collection area of 125 at 300°F (150°C). Since the flue gas flow rate for the PTC is 130 SCFM (standard cubic feet per minute; about 3.7 NCMM (normal m³/min)), the gas velocity through the ESP is 5 ft/min (about 1.52 m/min). The plate spacing for the ESP unit is 11 in (27.9 cm). The ESP was designed to facilitate thorough cleaning between tests so that all tests can begin on the same basis.

PTC Results

[00101] Results are illustrated in Figure 6. As can be observed in Figure 6, even though the tested sorbent particle size is significantly larger than normal sorbent particles, the treated larger-than-normal sized (that is, >60 micrometers) activated carbon sorbent was quite effective at capturing mercury. Approximately 75% of the mercury was captured when the larger-sized treated AC was injected ahead of the pilot-scale ESP, while approximately 85% of the mercury was captured when injected ahead of the pilot-scale fabric filter ("FF"). Note that in Figure 6 (and throughout) "Macf" (and "MACF") indicates million actual cubic feet (1 MACF is about 0.028 million actual cubic meters or "MACM").

[00102] Referring now to Figure 7, it can be observed that the larger-sized treated AC when injected ahead of the pilot-scale ESP (diamond symbol(s)) performed better than the finer standard AC (triangles) under the same arrangement. In comparison, when injected ahead of the fabric filter (FF), the larger-sized treated AC (square) performed similarly to slightly worse. However, for this application, the larger-sized treated AC can be physically separated from the smaller flyash particles, and the sorbent can then be regenerated, recycled, and reused. This will substantially improve overall utilization and economics. These data thus show that a larger-than-normal sized sorbent can provide effective mercury control and ease flyash and AC separation, thereby also preserving the characteristics of the flyash for sale and beneficial use. Accordingly, because >60 µm sorbent particles have been successfully demonstrated, superior mercury control can be obtained with >40 µm particles, which may be preferred in some applications, depending on the sorbent particle/ash separation system used. Note that in Figure 7 (and throughout) "Macf" (and "MACF") indicates million actual cubic feet.

Example 7 - Liquid Phase (Organic Solvent) Halogenation

[00103] A 5% solution of bromine in ligroin was prepared by carefully adding 50 g of bromine to 1 liter of cold ligroin. One kg of activated carbon was added to the bromine solution in a large metal can. The slurry was stirred with a large paddle during the addition and for a short time afterwards

until all the bromine had reacted with the carbon as indicated by the disappearance of the red color. The slurry was filtered using a Buchner funnel under vacuum. The carbon cake that was collected on the filter was dried in an oven at 110°C for several hours until it appeared dry and a constant weight was obtained. As in Example 1, some moisture was left in the carbon, however. The dried carbon was then tumbled in the rotating barrel with metal pieces to break up and fluff the carbon.

Example 8 - Promoted Activated Carbon Sorbents

[00104] A bench-scale procedure based on the above description was used to test the initial activities and capacities of several promoted activated carbon sorbents using powdered carbon, including the bromine-containing activated carbons prepared from a commercially available sorbent and an aerogel carbon film sorbent, as well as the original precursor carbons for comparison. Bromine-treated carbons were prepared by impregnation of the powdered activated carbon precursors in a stirred solution of bromine in carbon tetrachloride or methylene chloride, or alternatively, in an aqueous solution of HBr, followed by drying in air at ambient temperature and drying in an oven at 100°C in air or nitrogen. Bromine-treated carbons were also prepared by impregnating bromine from the gas phase by passing the gas through a rotating dry bed of the activated carbon precursor. The results indicated that adding a second component to the solution improved the capacity of the sorbent.

[00105] The carbons were initially tested in a heated bed, where a synthetic flue gas stream containing elemental mercury ($11 \mu\text{g}/\text{m}^3$) was passed through the bed. Concentrations of total and elemental Hg in the effluent gas were determined using a Sir Galahad mercury CEM ("continuous emission monitor") (mfr. P S Analytical, Deerfield Beach, FL, USA). The powdered sorbent was supported on a quartz filter during the test, and the other sorbents were tested as a triple layer. A comparison of the original commercial-grade powdered carbon sorbent with the sorbent after it was treated with 0.1 N HBr, and the powder was collected by centrifugation and drying, revealed that the mercury capture activity increased from an initial capture efficiency of about 50% of the Hg in the inlet to 100% capture. A comparison of the sorbent after subsequent regeneration with HBr indicated that it not only captured mercury at the same level as before (100% capture) but its capacity was prolonged by several minutes, and thus enhanced. Similar results were obtained with the carbon film and carbon fiber sorbents by treatment with molecular bromine in solution or in dry beds as described above.

Example 9 - Fluidized/Ebulliated Bed Preparation

[00106] An activated carbon sorbent was prepared by treating the carbon by impregnating molecular bromine from a gas composition containing molecular bromine by flowing the gas through a liquid bromine reservoir in series with a fluidized bed or ebulliated bed of the carbon. The amount of

bromine taken up by the carbon ranges (in one example) from <1 to about 30 g per 100 g of activated carbon, depending on the proportions used.

Example 10 - Full-Scale Testing

[00107] In this example, a baghouse (fabric filter) or ESP was used to collect particulates in the exhaust of a full-scale commercial pulverized coal-burning facility. A scrubber and sorbent bed were also used to remove undesired constituents from the flue gas stream, before being fed to the stack. In this example, the halogen/halide promoted carbon sorbent was injected into the flue gas after the boiler. In general however, the inventive sorbent can be injected where desired (e.g., before, after, or within the boiler).

[00108] In one exemplary test conducted at a facility fired with lignite coal, the flue gas phase mercury (elemental) concentration was between 10 and 11 $\mu\text{g}/\text{m}^3$. The ash and injected carbon were collected in the baghouse at 350°F to 375°F (about 175-190°C). Injection of commercial-grade activated carbon powder (untreated) at a rate of 1.0 lb/MACF ("MACF" and "Macf" represent one million actual cubic feet; 1.0 lb/MACF is about 16 kg/MACM (million actual cubic meters)) resulted in mercury effluent concentrations of 3.8-4.2 $\mu\text{g}/\text{m}^3$ (representing 62%-58% removal of the mercury from the gas, respectively), and at 2.0 lb/MACF (about 32 kg/MACM), gave 74%-71% removal. Injection of the bromine-treated carbon at 1.0 lb/MACF resulted in 73%-69% removal and at 2.0 lb/MACF gave 86%-84% removal. Thus, a significant increase in the mercury capture was exhibited during use of the bromine promoted carbon sorbent of the present invention.

Example 11A - Addition of Optional Alkaline Component – Bench-Scale

[00109] The efficiency of the activated carbons for mercury capture can be improved considerably by employing a basic material co-injected with the activated carbon, in order to capture any oxidized mercury that may be released from the sorbent, or to capture some of the sulfur or selenium oxides in the flue gas that can have a detrimental effect on the sorbent capacity.

[00110] Bench-scale testing was conducted by preparing a filter composed of 37 mg of brominated activated carbon mixed with 113 mg of calcium oxide. The test was conducted as described in Example 1 and compared with the same carbon sorbent but with an inert diluent. The breakthrough curve for the mixture of brominated (2%) NORIT Darco FGD sorbent with inert sand is shown in Figure 8, and the breakthrough curve for the mixture with CaO is shown in Figure 9. It can be seen that the point of 50% breakthrough improves to 65 minutes with the mixture with CaO from only 48 min with the sand mixture.

Example 11B - Addition of Optional Alkaline Component – Pilot-Scale

[00111] Tests were conducted on the pilot-scale PTC combustor described above with reference to Example 6 while firing a Texas lignite to evaluate mercury control by co-injecting a standard activated carbon (also referred to herein as “AC”) and an alkali material upstream of a fabric filter. Typical results are illustrated in Figure 10. As shown in Figure 10, co-injecting lime with activated carbon vastly improved mercury removal. Mercury removals of approximately 90% were achieved with the co-injected sorbents, whereas less than 60% removal was achieved with the use of standard AC alone, even at much higher injection rates. Data from similar tests show that injecting similar quantities of sodium carbonate and AC, and lime and AC, resulted in mercury removals of approximately 80%, and 87%, respectively. These data suggest that other alkali can also be co-injected with AC to improve mercury removal. Other data show that flue gas temperature may impact the effectiveness of the alkali addition. Further test data indicate that flue gas contaminants, flue gas constituents (SO₂, NO_x, HCl, etc.), operating temperature, mercury form, and mercury concentration may impact the effectiveness of the alkali addition. This indicates that it may be desirable to be able to adjust and tailor, onsite, the alkali-to-AC ratio in order to optimize removal for a given set of site conditions.

[00112] Without wishing to be bound by any particular theory, the synergy observed in the improved performance when co-injecting the two materials can be explained as follows. First, tests indicate that binding sites on AC can be consumed by sulfur species and other contaminants. The alkali material interacts and reacts with these species thus minimizing their consumption of AC mercury binding sites. Second, other work has shown that standard AC will continue to oxidize mercury even though the binding sites are fully consumed. This oxidized mercury can then react with alkali material and subsequently be captured by the particulate control device. Thus, combining alkali with treated and/or non-treated AC synergistically takes advantage of these two mechanisms, resulting in improved mercury capture at reduced costs.

Example 12- Brominated Carbon Sorbent for Gasification Fuel Gas

Preparation of 5%Br₂W-AC

[00113] Using a procedure similar to Example 3, a 2.5 wt/vol% solution of bromine in water was prepared. Granular Calgon F400 was added to the bromine solution to give a 5 wt/wt% brominated carbon product. The bromine solution was stirred with a large paddle during and after the addition until the red color in the water disappeared. The suspension was filtered by vacuum on a large

Buchner funnel. The filter cake was dried in air, and then in an oven at 110°C until a stable weight was obtained. The moisture was reduced to 15%.

Preparation of 5%Br₂D-AC

[00114] A brominated sorbent was prepared from Br₂ addition in solvent as described in Example 7, except that dichloromethane was used as the solvent instead of ligroin, and granular Calgon F400 was used.

Preparation of 5%PBr₃-AC

[00115] A phosphohalogenated sorbent was prepared from PBr₃ using the method described in Example 5, except granular Calgon F400 was used.

Testing in Hydrogen Atmosphere - Procedure

[00116] To simulate the capture of mercury from a heated fuel gas or syngas from coal gasification, tests were conducted employing a stream comprising 10% vol/vol hydrogen in nitrogen passing through the sorbent at 500 cc/min. The stream contained 26.9 micrograms/m³ of elemental mercury from a commercial mercury permeation source.

[00117] In the tests, the sorbent (0.5 g) was placed in a 0.39 inch (1 cm, inside diameter) glass tube fitted with a medium frit sintered glass filter disc to hold the sorbent in the gas stream. The tube containing the sorbent bed was connected to a gas inlet tube for introducing the gas stream containing the mercury vapor and at the outlet to a tube connection to the detector. The detector was a Semtech 2000 continuous mercury emission monitor. The tube was equilibrated in a nitrogen flow (450 cc/min) for 5 minutes at ambient temperature to stabilize the system. The detector showed 0 concentration of mercury in the effluent from the sorbent bed. (The blank run with no sorbent read 26.9 micrograms/m³). The tube was then placed in an oven at the selected temperature for the test (from 250° to 400°C). Effluent mercury concentration data from the detector were collected until the detector showed a constant reading for 5 minutes. Hydrogen (50 cc/min) was then added to the gas stream and detector readings were taken every 5 min. Tests were conducted at several oven temperatures for various periods of time up to 3 hours, depending on the temperature and sorbent. The elemental mercury concentration data were plotted as a percent of inlet mercury concentration versus time as in Example 1. All the mercury in the effluent was elemental, so a single detector was sufficient, and no SnCl₂ trap was needed to convert to elemental mercury (as in Example 1). The time for 50% breakthrough (time to reach 50% capture) was then determined from the breakthrough curves.

Results

[00118] The results are shown in Table 1 (below) for the unbrominated sorbent (Calgon F-400), the brominated sorbents (5%Br2W-AC and 5%BrD-AC), and the phosphobrominated sorbent (5%PBr3-AC). The maximum mercury concentration obtained in the effluent in each run is also reported in Table 1 for the time period indicated in the last column.

[00119] Under the reducing hydrogen conditions, the unbrominated sorbent broke through immediately and was exhausted after only 6.5 min. This complete failure occurred because the hydrogen reduces the captured mercury in the unbrominated sorbent at any temperature above 100°C. Both of the brominated sorbents exhibited excellent reactivity and good capacity at all temperatures, up to at least 400°C. The phosphobrominated sorbent exhibited superior reactivity and capacity at all temperatures, up to at least 400°C.

Table 1

Times for 50% Breakthrough
Maximum Observed Hg Concentrations for Sorbents
(10% Hydrogen Streams)

Sorbent	Temp (°C)	50% breakthrough (min)	Maximum [Hg] (µg/m ³)	Time (min)
F-400	250	6	20.3	6.5
5%Br2W-AC	250	>150	1.4	150
5%Br2W -AC	300	>180	4.3	180
5%Br2W-AC	350	160	15.1	180
5%Br2W-AC	400	60	13.9	65
5%PBr3-AC	250	>140	0.4	140
5%PBr3-AC	300	>150	0.5	150
5%PBr3-AC	350	>150	1.4	150
5%Br2D-AC	350	>180	2.1	180
5%Br2D-AC	400	>180	10.9	180

[00120] While the preferred embodiments of the invention have been shown and described, modifications thereof can be made by one skilled in the art without departing from the spirit and teachings of the invention. The embodiments described herein are exemplary only, and are not intended to be limiting. Many variations and modifications of the invention disclosed herein are possible and are within the scope of the invention. Accordingly, the scope of protection is not limited by the description set out above, but is only limited by the claims which follow, that scope including all equivalents of the subject matter of the claims.

[00121] The examples provided in the disclosure are presented for illustration and explanation purposes only and are not intended to limit the claims or embodiment of this invention. While the preferred embodiments of the invention have been shown and described, modifications thereof can be made by one skilled in the art without departing from the spirit and teachings of the invention. Process criteria, equipment, and the like for any given implementation of the invention will be readily ascertainable to one of skill in the art based upon the disclosure herein. The embodiments described herein are exemplary only, and are not intended to be limiting. Many variations and modifications of the invention disclosed herein are possible and are within the scope of the invention. Use of the term “optionally” with respect to any element of the invention is intended to mean that the subject element is required, or alternatively, is not required. Both alternatives are intended to be within the scope of the invention.

[00122] The discussion of a reference in the Background is not an admission that it is prior art to the present invention, especially any reference that may have a publication date after the priority date of this application. The disclosures of all patents, patent applications, and publications cited herein are hereby incorporated herein by reference in their entirety, to the extent that they provide exemplary, procedural, or other details supplementary to those set forth herein.

[00123] Although the invention is described herein as a sorbent material and associated processes for its preparation and use, it is nevertheless not intended to be limited to the details described, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

CLAIMS

WE CLAIM:

1. A promoted carbon sorbent comprising a base activated carbon that has reacted with a promoter selected from the group consisting of halides, halogens, and combinations thereof, such that the reaction product is effective for the removal of mercury from a gas stream.

ABSTRACT

A promoted activated carbon sorbent is described that is highly effective for the removal of mercury from flue gas streams. The sorbent comprises a new modified carbon form containing reactive forms of halogen and halides. Optional components may be added to increase reactivity and mercury capacity. These may be added directly with the sorbent, or to the flue gas to enhance sorbent performance and/or mercury capture. Mercury removal efficiencies obtained exceed conventional methods. The sorbent can be regenerated and reused. Sorbent treatment and preparation methods are also described. New methods for in-flight preparation, introduction, and control of the active sorbent into the mercury contaminated gas stream are described.

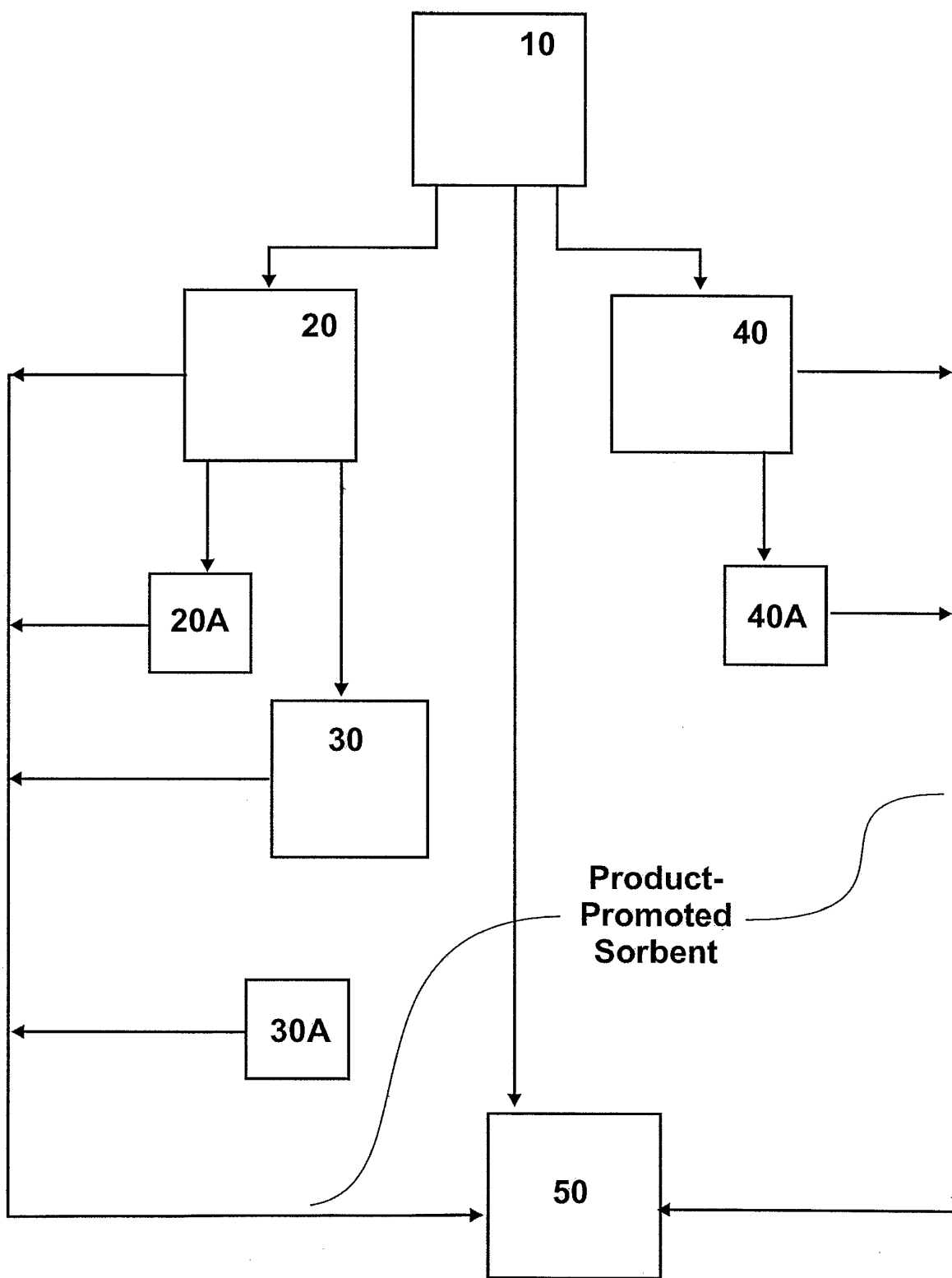
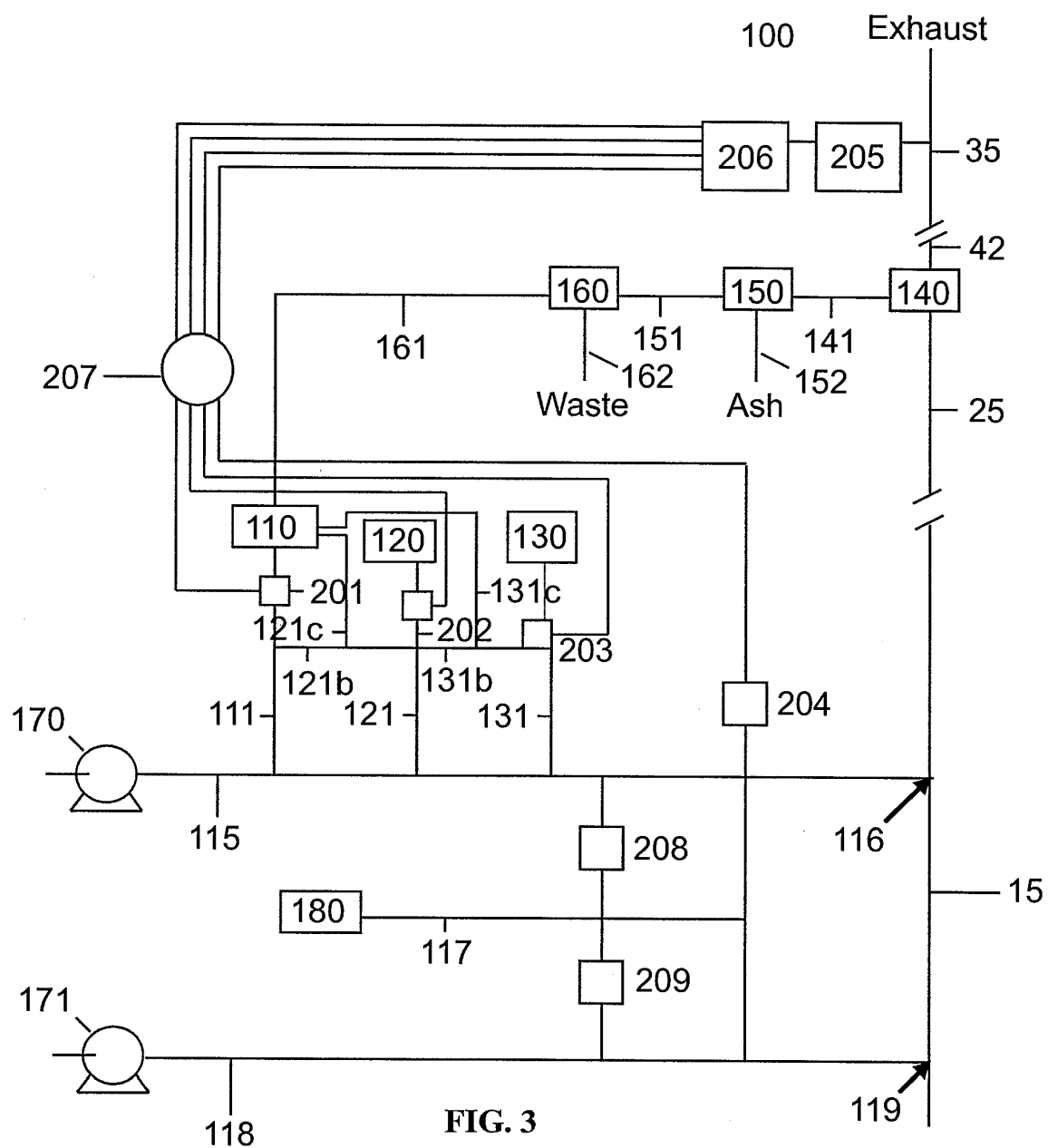
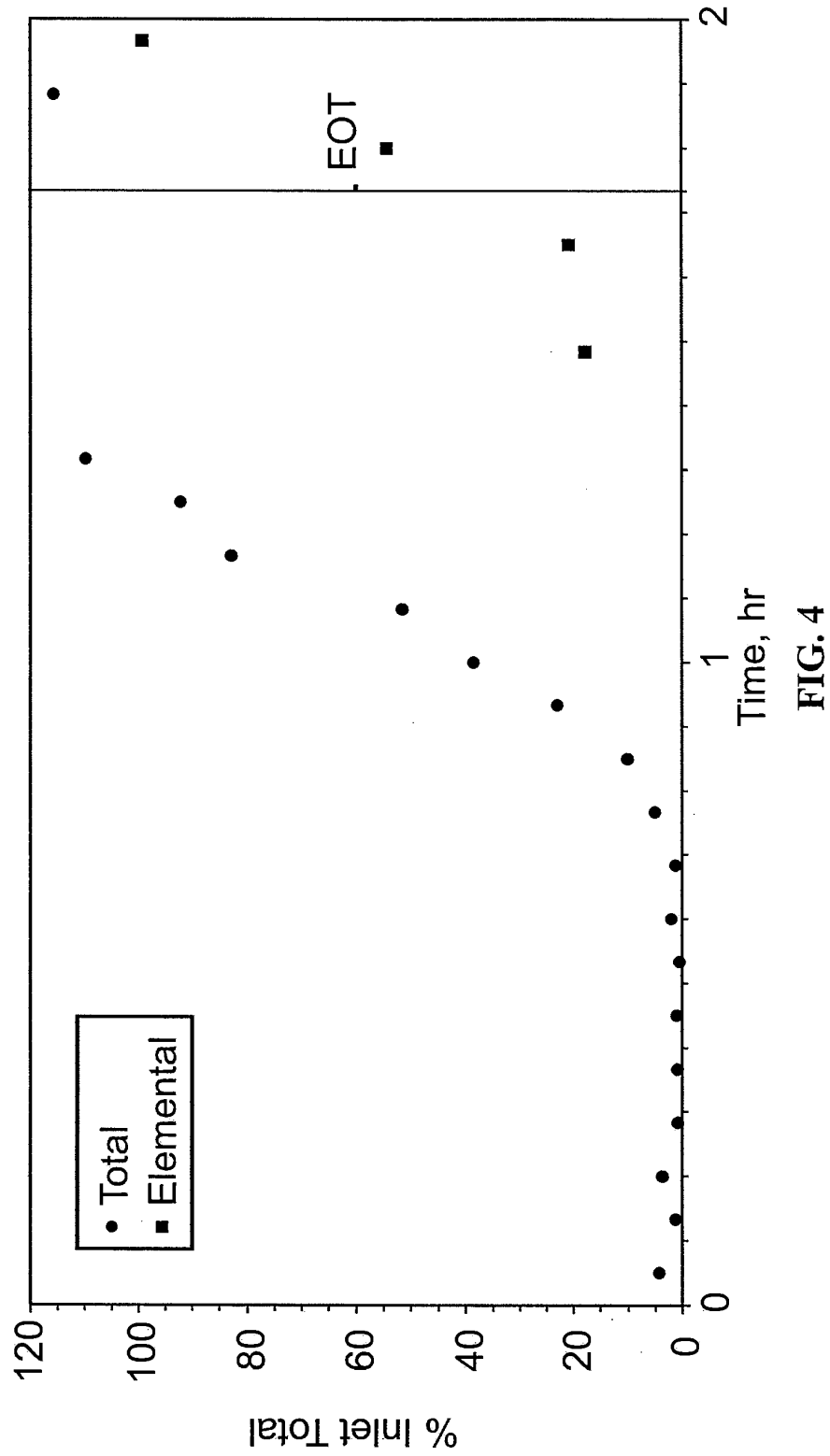
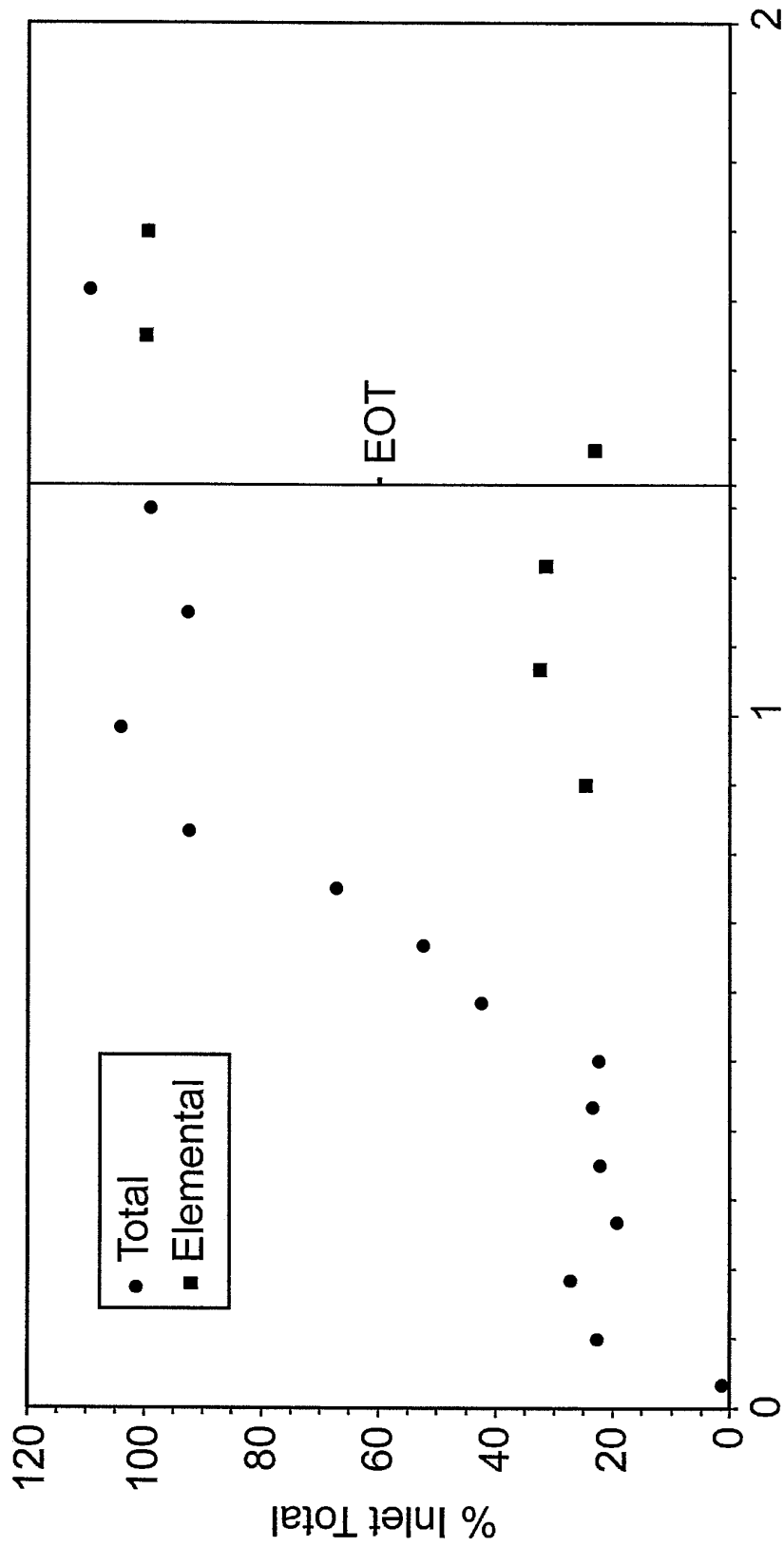


FIG. 1

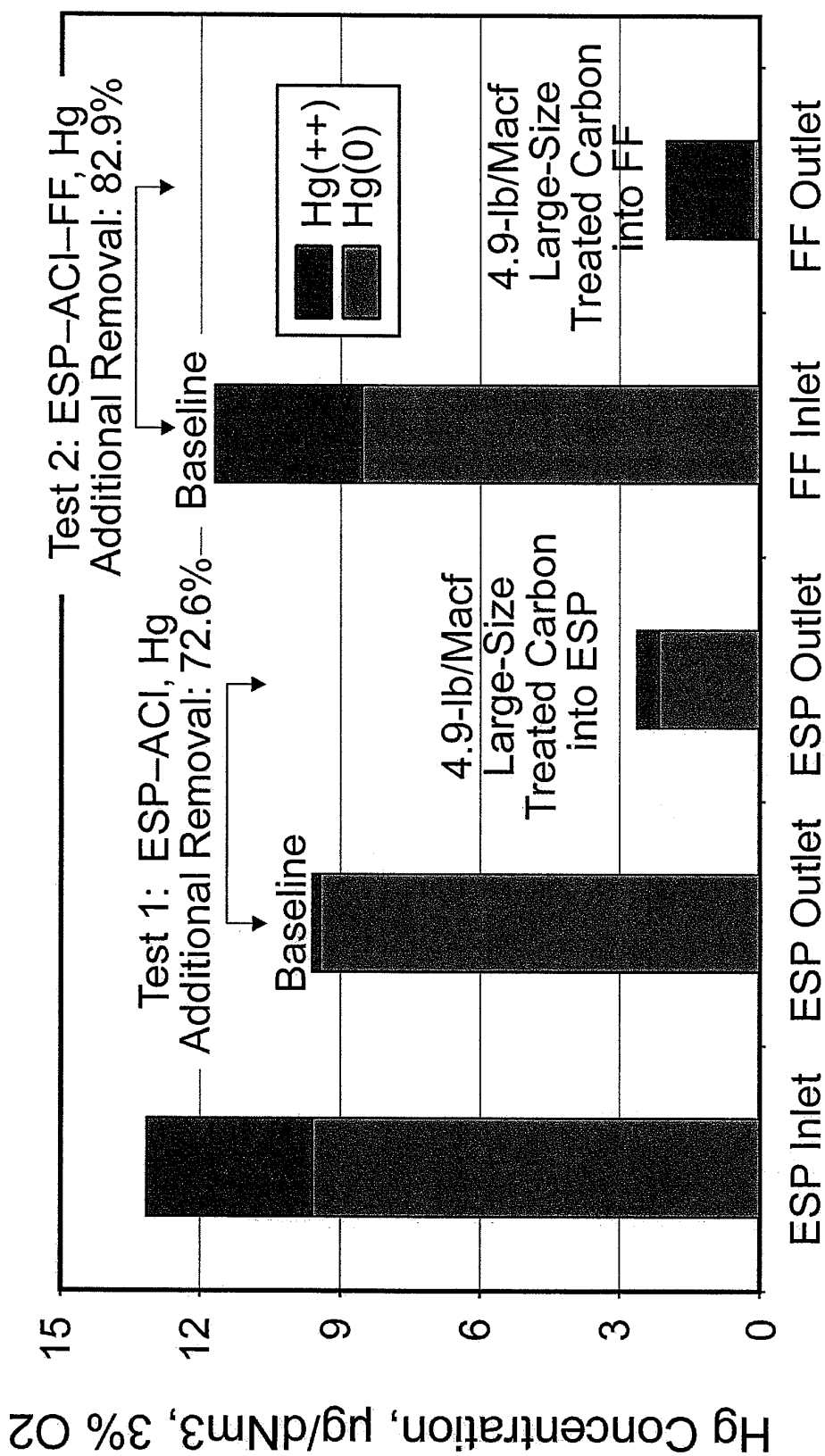








Time, hr
FIG. 5

**FIG. 6**

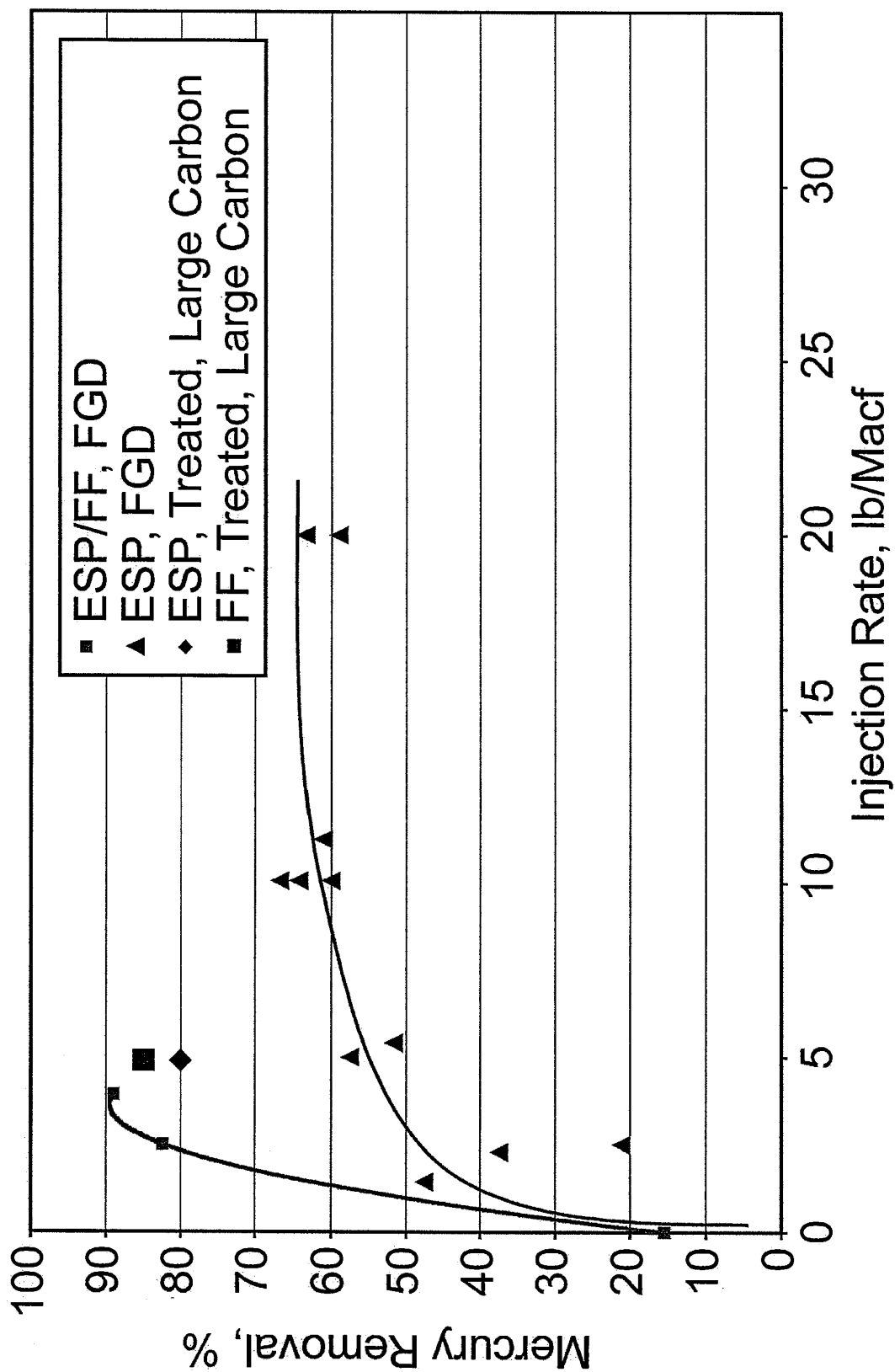
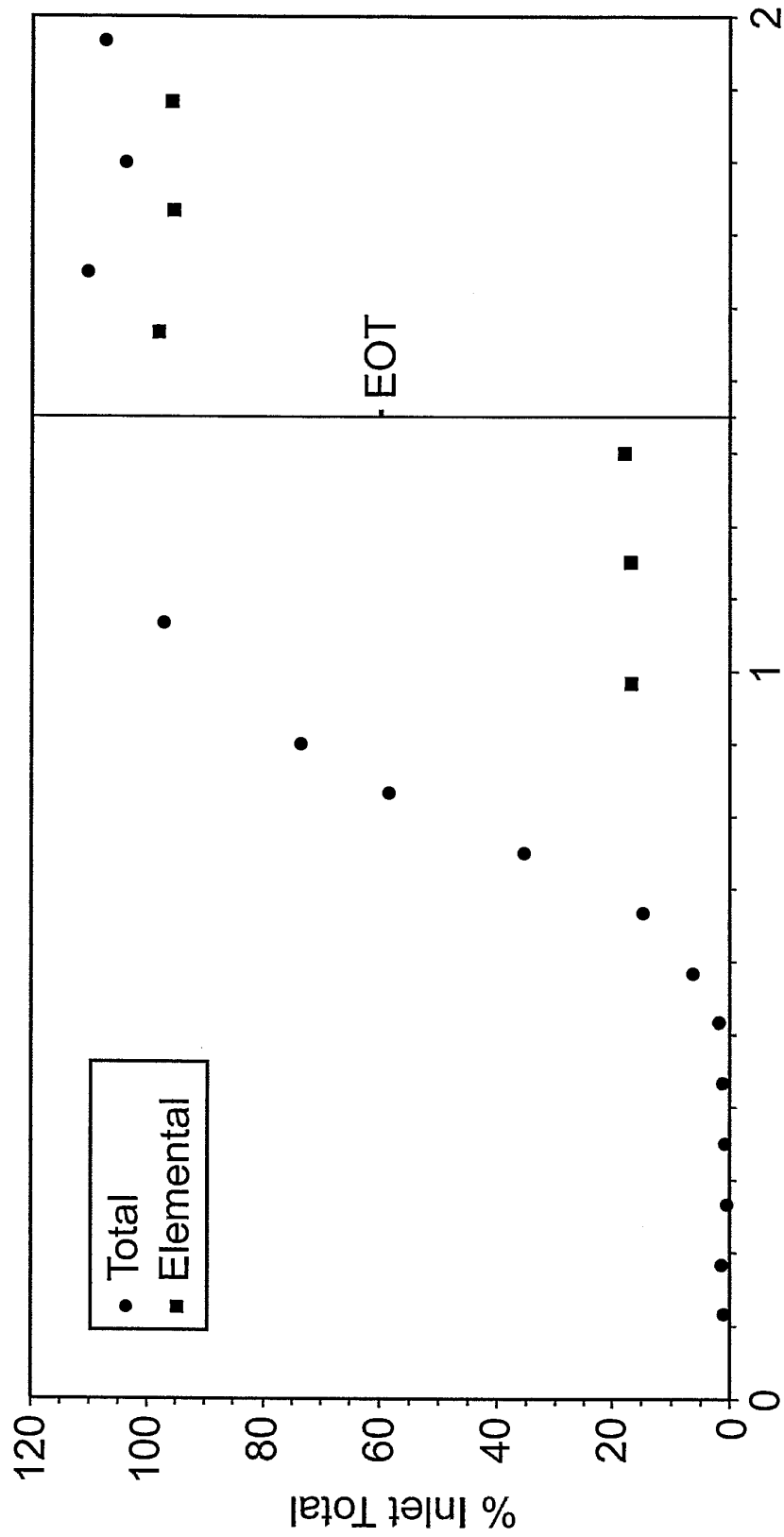


FIG. 7



Time, hr
FIG. 8

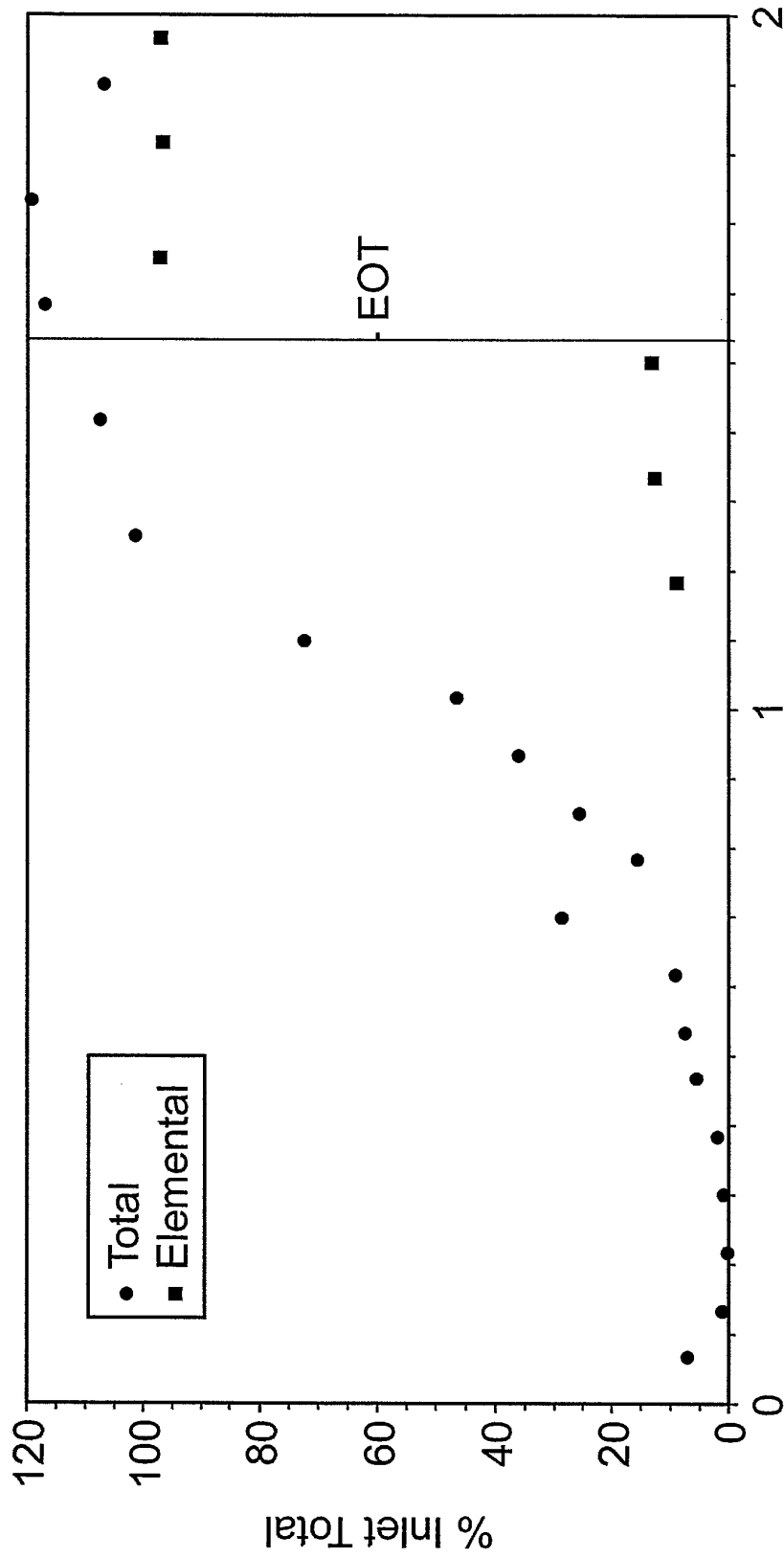


FIG. 9

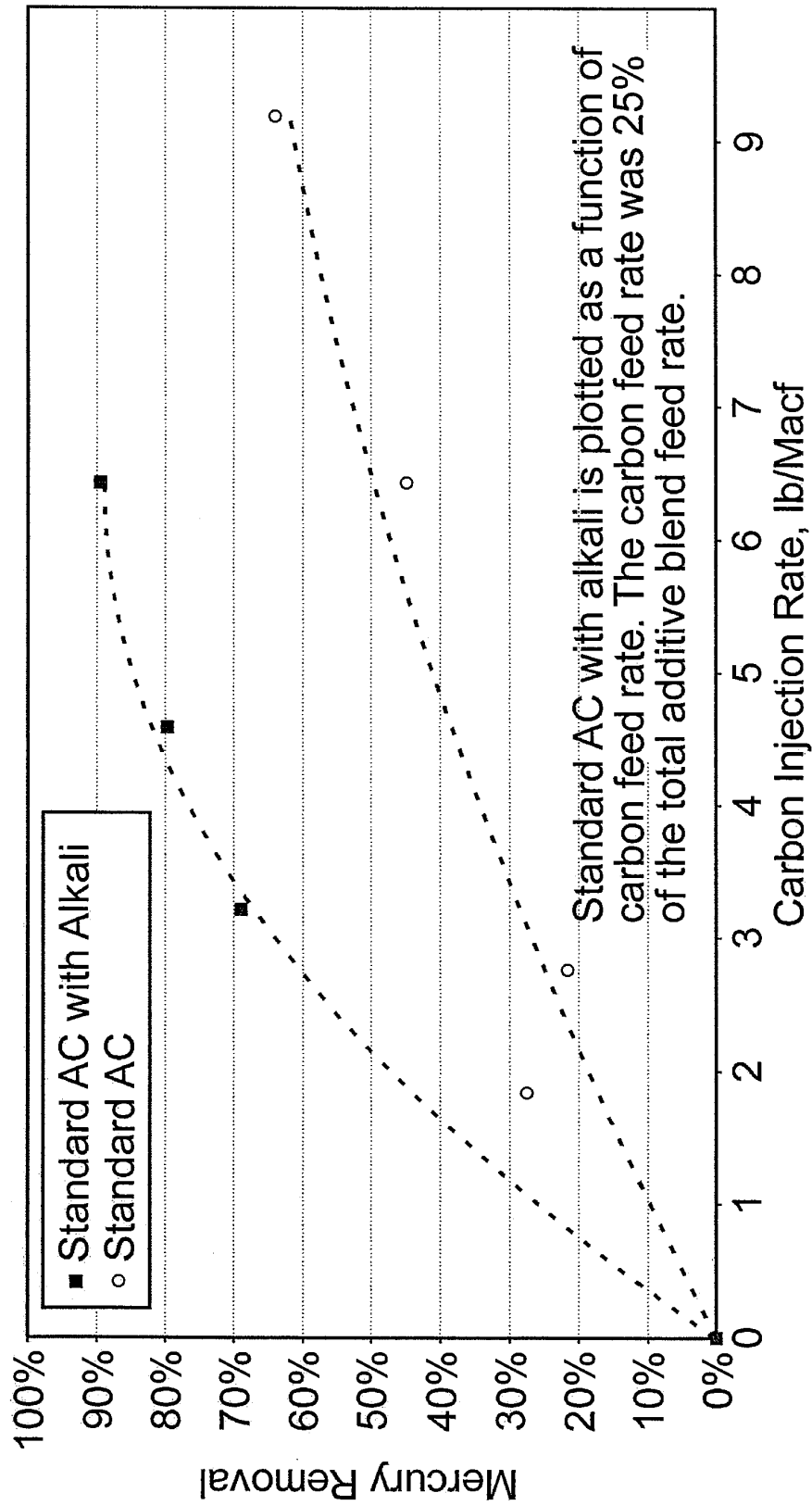


FIG. 10

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson et al.		
Filer:		Rigel J. Menard/Jamie Ehlers		
Attorney Docket Number:		3338.005US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1600

Electronic Acknowledgement Receipt

EFS ID:	22351882
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson et al.
Customer Number:	21186
Filer:	Rigel J. Menard/Jamie Ehlers
Filer Authorized By:	Rigel J. Menard
Attorney Docket Number:	3338.005US7
Receipt Date:	14-MAY-2015
Filing Date:	
Time Stamp:	17:05:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 1600
RAM confirmation Number	3733
Deposit Account	190743
Authorized User	LANZATELLA, NICHOLAS
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		3338005US7CONApplicationFILED.pdf	7740238	yes	52
			6729ad93a8b2dbcb1f334b07d0ee32026d94df93		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal of New Application		1	1	
	Application Data Sheet		2	8	
	Oath or Declaration filed		9	11	
	Specification		12	40	
	Claims		41	41	
	Abstract		42	42	
	Drawings-only black and white line drawings		43	52	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	35137	no	2
			354df05316f32524920491e50330260bb1b8c46b		
Warnings:					
Information:					
Total Files Size (in bytes):			7775375		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Attorney Docket No.: 3338.005US7

Customer No.: 21186

PATENT APPLICATION TRANSMITTAL

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items and information (as indicated with an "X"):

X CONTINUATION under 37 CFR 1.53(b) of prior Patent Application No. 14/318,270 comprising:

X Specification (31 pgs, including claims numbered 1 through 1 and a 1 page Abstract).

X Formal Drawing(s) (10 sheets).

X Application Data Sheet (7 pgs).

X Copy of signed Declaration (3 pgs) from prior application.

X **Authorization to charge Deposit Account 19-0743 in the amount of \$1,600.00**

X Preliminary Amendment (3 pgs).

The filing fee has been calculated below as follows:

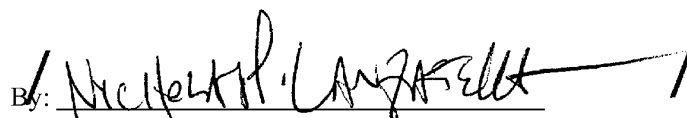
	No. Filed	No. Extra	Rate	Fee
TOTAL CLAIMS	1 - 20	0	x \$80.00 =	\$0.00
INDEPENDENT CLAIMS	1 - 3	0	x \$420.00 =	\$0.00
[] MULTIPLE DEPENDENT CLAIMS PRESENTED				\$0.00
BASIC FEE				\$280.00
SEARCH FEE				\$600.00
EXAMINATION FEE				\$720.00
	No. of pages (75% for e-filing)	Extra sets of 50 pages	Rate	
APPLICATION SIZE FEE	(31 - 100) / 50	0	\$400.00	\$0.00
TOTAL				\$1,600.00

Please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer Number: 21186

By:



Nicholas P. Lanzatella

Reg. No. 63,803

Date of Deposit: May 14, 2015

This paper or fee is being filed on the date indicated above using the USPTO's electronic filing system EFS-Web, and is addressed to The Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Unknown

Serial No.: 14/712,558

Group Art Unit: Unknown

Filed: May 14, 2015

Docket No.: 3338.005US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL PRELIMINARY AMENDMENT

MS Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Prior to taking up this application for examination, please enter the following amendments:

IN THE CLAIMS

Please amend the claims as follows:

1. (Canceled)
2. (New) A method for separating mercury from a mercury-containing gas, the method comprising:
 - combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof;
 - adding a particulate sorbent material comprising activated carbon into the mercury-containing gas;
 - promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material;
 - chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and
 - separating the mercury-sorbent particulate from the mercury-containing gas.
3. (New) The method of claim 2, further comprising adding the promoter to the coal before combusting the coal.
4. (New) The method of claim 3, wherein the promoter added to the coal is in an organic solvent.
5. (New) The method of claim 4, wherein the organic solvent is a hydrocarbon, a chlorinated hydrocarbon, supercritical carbon dioxide, or a combination thereof.

6. (New) The method of claim 2, wherein the particulate promoted sorbent material comprises active sites, wherein the active sites comprise halide anions bound to the activated carbon.
7. (New) The method of claim 2, wherein the particulate promoted sorbent material comprises active sites, wherein the active sites comprise carbocations bound to halide anions.
8. (New) The method of claim 2, wherein chemically reacting the sorbent material with the promoter in the mercury-containing gas comprises chemically reacting carbene species edge sites in the activated carbon with the promoter.
9. (New) The method of claim 2, wherein carbocations in the activated carbon of the mercury-sorbent particulate accept electrons from mercury atoms of the mercury-sorbent particulate.
10. (New) The method of claim 2, wherein the promoter is substantially in vapor form in the mercury-containing gas.
11. (New) The method of claim 2, wherein the promoter is chosen from Cl_2 , Br_2 , HCl , HBr , and a combination thereof.
12. (New) The method of claim 2, wherein the promoter is chosen from Br_2 , HBr , and a combination thereof.
13. (New) The method of claim 2, wherein the promoter is chosen from PBr_3 , SCl_2 , and a combination thereof.
14. (New) The method of claim 2, wherein the promoter is chosen from I_2 , HI , and combinations thereof.

15. (New) The method of claim 2, wherein the activated carbon is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

16. (New) The method of claim 2, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

17. (New) The method of claim 2, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

18. (New) The method of claim 2, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

19. (New) The method of claim 18, wherein the secondary component is chosen from halogens, HI, HBr, HCl, and combinations thereof.

20. (New) The method of claim 18, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

21. (New) A method for separating mercury from a mercury-containing gas, the method comprising:

adding a promoter to coal, wherein the promoter is chosen from Br₂, HBr, and combinations thereof;

combusting the coal to form the mercury-containing gas;

injecting a particulate sorbent material comprising activated carbon into the mercury-containing gas;

promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material;

chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and

separating the mercury-sorbent particulate from the mercury-containing gas.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's representative at (612) 349-9580 to facilitate prosecution of this application.

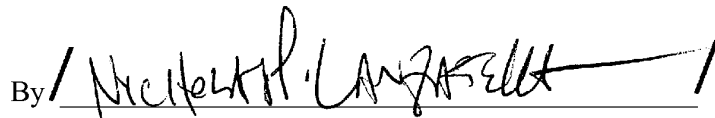
If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully Submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402--0938
(612) 349-9580

Date May 15, 2015

By



Nicholas P. Lanzatella

Reg. No. 63,803

Electronic Acknowledgement Receipt

EFS ID:	22357184
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson et al.
Customer Number:	21186
Filer:	Rigel J. Menard/Jamie Ehlers
Filer Authorized By:	Rigel J. Menard
Attorney Docket Number:	3338.005US7
Receipt Date:	15-MAY-2015
Filing Date:	
Time Stamp:	11:55:36
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		3338005US7SuppPrelimAmendmentFILED.pdf	133722	yes	7
			747b0528f92b3d2f061d4bbf87dbf9628be2cb9f		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Transmittal Letter	1	1
	Preliminary Amendment	2	2
	Claims	3	6
	Applicant Arguments/Remarks Made in an Amendment	7	7
Warnings:			
Information:			
Total Files Size (in bytes):		133722	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 3338.005US7

Filed: May 14, 2015

Examiner: Unknown

Customer No.: 21186

Serial No.: 14/712,558

Due Date: N/A

Group Art Unit: Unknown

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

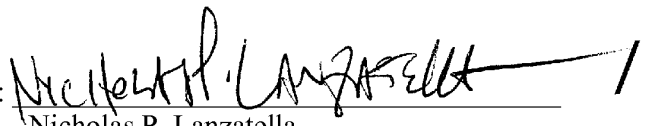
We are transmitting herewith the following attached items (as indicated with an "X"):

X Supplemental Preliminary Amendment (6 pgs.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (j), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT	05/15/2015	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X \$80 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X \$420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE							0

(Column 1) (Column 2) (Column 3)

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

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

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

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

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

LIE
/DENISE HOPKINS/

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 NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
14/712,558	05/14/2015	1736	1600	3338.005US7	20	2

CONFIRMATION NO. 1934

FILING RECEIPT



0000000075388583

21186

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

Date Mailed: 05/28/2015

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

Inventor(s)

Edwin S. Olson, Grand Forks, ND;
Michael J. Holmes, Thompson, ND;
John Henry Pavlish, East Grand Forks, MN;

Applicant(s)

Energy & Environmental Research Center Foundation, Grand Forks, ND;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 14/318,270 06/27/2014
which is a CON of 13/966,768 08/14/2013 PAT 8821819
which is a CON of 13/427,665 03/22/2012 PAT 8512655
which is a CON of 12/419,219 04/06/2009 PAT 8168147
which is a CON of 12/201,595 08/29/2008 ABN
which is a DIV of 11/209,163 08/22/2005 PAT 7435286
which claims benefit of 60/605,640 08/30/2004

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

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

If Required, Foreign Filing License Granted: 05/26/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/712,558**

Projected Publication Date: 09/03/2015

Non-Publication Request: No

Early Publication Request: No

Title

SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Preliminary Class

423

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 Assets Control, 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 14/712,558	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	20	minus 20 = *			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *			OR	x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1600
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	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))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	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))					OR	
	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.							

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-2001/0002387A1	5/31/2001	Tsutsumi, Yoshio, et al.
	US-2001/0003116A1	6/7/2001	Neufert, Ronald
	US-2002/0043496A1	4/18/2002	Boddu, Veera M., et al.
	US-2002/0134242A1	9/26/2002	Yang, Ralph T, et al.
	US-2002/0150516A1	10/17/2002	Pahlman, John, et al.
	US-2003/0104937A1	6/5/2003	Sinha, R. K.
	US-2003/0136509A1	7/24/2003	Virtanen, Jorma
	US-2004/0003716A1	1/8/2004	Nelson Jr, Sidney
	US-2004/0013589A1	1/22/2004	Vosteen, Bernhard, et al.
	US-2004/0076570A1	4/22/2004	Jia, Charles Q
	US-2005/0019240A1	1/27/2005	Lu, Xiao-chun, et al.
	US-2006/0048646A1	3/9/2006	Olson, Edwin S, et al.
	US-2006/0191835A1	8/31/2006	Petrik, Viktor I, et al.
	US-2008/0090951A1	4/17/2008	Mao, Dongsheng, et al.
	US-2008/0182747A1	7/31/2008	Sinha, R. K.
	US-2008/0292512A1	11/27/2008	Kang, Shin G.
	US-2009/0062119A1	3/5/2009	Olson, Edwin S., et al.
	US-2009/0136401A1	5/28/2009	Yang, Xiaolin David, et al.
	US-2009/0320678A1	12/31/2009	Chang, Ramsay, et al.
	US-2010/0047146A1	2/25/2010	Olson, Edwin S., et al.
	US-2011/0168018A1	7/14/2011	Mohamadalizadeh, Ali, et al.
	US-2012/0183458A1	7/19/2012	Olson, Edwin S, et al.
	US-2013/0280156A1	10/24/2013	Olson, Edwin S, et al.
	US-2014/0056787A1	2/27/2014	Olson, Edwin S, et al.
	US-2014/0255279A1	9/11/2014	Olson, Edwin S, et al.
	US-2014/0308188A1	10/16/2014	Olson, Edwin S, et al.
	US-2015/0098878A1	4/9/2015	Olson, Edwin S
	US-1,984,164	12/11/1934	Alfred, Stock
	US-2,317,857	4/27/1943	Soday, Frank J
	US-3,194,629	7/13/1965	Dreibelbis, John A, et al.
	US-3,662,523	5/16/1972	Revoir, William H, et al.
	US-3,786,619	1/22/1974	Meikersson, Karl-axel
	US-3,826,618	7/30/1974	Capuano, Italo A
	US-3,849,267	11/19/1974	Hilgen, Hendrika, et al.
	US-3,876,393	4/8/1975	Kasai, Juichi, et al.
	US-4,094,777	6/13/1978	Sugier, Andre, et al.
	US-4,101,631	7/18/1978	Ambrosini, Ronald Frank, et al.

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 2 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-4,196,173	4/1/1980	deJong, Geert J, et al.
	US-4,338,896	7/13/1982	Papasideris, Stamos I.
	US-4,500,327	2/19/1985	Nishino, Hirosh, et al.
	US-4,708,853	11/24/1987	Matviya, Thomas, et al.
	US-4,786,483	11/22/1988	Audeh, Costandi A
	US-4,814,152	3/21/1989	Yan, Tsoung Y
	US-4,820,318	4/11/1989	Chang, Chin-hsiung, et al.
	US-4,889,698	12/26/1989	Moller, Jens, et al.
	US-4,956,162	9/11/1990	Smith, et al.
	US-5,300,137	4/5/1994	Weyand, Thomas E., et al.
	US-5,336,835	8/9/1994	McNamara, James D.
	US-5,409,522	4/25/1995	Durham, Michael D, et al.
	US-5,462,908	10/31/1995	Liang, Septimus -C H, et al.
	US-5,505,766	4/9/1996	Chang, Ramsay
	US-5,575,982	11/19/1996	Reiss, Guenter, et al.
	US-5,607,496	3/4/1997	Brooks, Richard J
	US-5,672,323	9/30/1997	Bhat, Pervaje, et al.
	US-5,695,726	12/9/1997	Lerner, B.
	US-5,827,352	10/27/1998	Altman, Ralph, et al.
	US-5,891,324	4/6/1999	Ohtsuka, Kiyoto
	US-6,027,551	2/22/2000	Hwang, Jiann-Yang, et al.
	US-6,080,281	6/27/2000	Attia, Yosry A
	US-6,136,072	10/24/2000	Sjostrom, Sharon, et al.
	US-6,136,749	10/24/2000	Gadkaree, Kishor P, et al.
	US-6,214,304	4/10/2001	Rosenthal, Jurgen, et al.
	US-6,258,334	7/10/2001	Gadkaree, Kishor, et al.
	US-6,372,187	4/16/2002	Madden, Deborah A, et al.
	US-6,375,909	4/23/2002	Dangtran, Ky, et al.
	US-6,383,981	5/7/2002	Blankenship, Steven, et al.
	US-6,471,936	10/29/2002	Chen, Pin, et al.
	US-6,528,030	3/4/2003	Madden, Deborah A., et al.
	US-6,638,485	10/28/2003	Iida, Kozo, et al.
	US-6,808,692	10/26/2004	Oehr, Klaus H.
	US-6,818,043	11/16/2004	Chang, Ramsay, et al.
	US-6,848,374	2/1/2005	Srinivasachar, Srivats, et al.
	US-6,878,358	4/12/2005	Vosteen, Bernhard, et al.
	US-6,942,840	9/13/2005	Broderick, Thomas E

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 3 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-6,953,494	10/11/2005	Nelson Jr., Sidney, et al.
	US-6,960,329	11/1/2005	Sellakumar, Kumar M.
	US-7,081,434	7/25/2006	Sinha, Rabindra K.
	US-7,211,707	5/1/2007	Axtell, Holly C, et al.
	US-7,435,286	10/14/2008	Olson, Edwin S, et al.
	US-7,479,263	1/20/2009	Chang, Shih-ger, et al.
	US-7,514,052	4/7/2009	Lissianski, Vitali Victor, et al.
	US-7,521,032	4/21/2009	Honjo, Shintaro, et al.
	US-7,544,338	6/9/2009	Honjo, S., et al.
	US-7,563,311	7/21/2009	Graham, James R
	US-7,611,564	11/3/2009	Mcchesney, Joe, et al.
	US-7,622,092	11/24/2009	Honjo, S., et al.
	US-7,722,843	5/25/2010	Srinivasachar, S.
	US-7,767,174	8/3/2010	Lui, K., et al.
	US-7,780,765	8/24/2010	Srinivasachar S., et al.
	US-8,007,749	8/30/2011	Chang, Shih-ger, et al.
	US-8,168,147	5/1/2012	Olson, Edwin S, et al.
	US-8,168,149	5/1/2012	Gal, Eli, et al.
	US-8,216,535	7/10/2012	Pollack, Nicholas R, et al.
	US-8,512,655	8/20/2013	Olson, Edwin S, et al.
	US-8,652,235	2/18/2014	Olson, Edwin S, et al.
	US-8,821,819	9/2/2013	Olson, Edwin S, et al.
	US-9,011,805	4/21/2015	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-1099490A1	4/21/1981	DeJong, et al.	
	CA-2150529A1	12/29/1995	Scherer, Volker, et al.	
	CA-2400898A1	8/30/2001	Maes, Rudy J, et al.	
	DE-10233173A1 (w/ English Abstract)	2/12/2004	Vosteen, Bernhard, et al.	
	DE-202012003747U1 (w/ English Abstract)	11/15/2012	Bluecher GmbH	
	DE-3426059A1 (w/ English Abstract)	1/16/1986	Seipenbusch, Jurgen, et al.	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 4 of 9		Attorney Docket No: 3338.005US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	EP-0208490A1	1/14/1987	Moller, Jens Thousig, et al.	
	EP-1570894A1	9/7/2005	Lissianski, V. V.	
	FR-2529802 (w/ English Abstract)	1/13/1984	Pelosi, J., et al.	
	JP-49-043197B4 (w/ English Abstract)	11/19/1974	Yokota, Noriyuki, et al.	
	JP-49-053590A (w/ English Abstract)	5/24/1974	Nippon Soda Co.	
	JP-49-066592A	6/27/1974	Sumitomo Chem Co Ltd	
	JP-49-53593A	5/24/1974	Nippon Soda Co.	
	JP-50-006438B4	3/13/1975	Yokota, Noriyuki, et al.	
	JP-51-003386A	1/12/1976	Soya, Kensuke, et al.	
	SU-1163982A (w/ English Abstract)	6/30/1985	Belozarov, I. M.	
	WO-01/62368A1	8/30/2001	Maes, Rudy J, et al.	
	WO-2004/089501A2	10/21/2004	Mazyck, D. W., et al.	
	WO-2013/162968A2	10/31/2013	Olson, Edwin S, et al.	
	WO-2013/162968A3	10/31/2013	Olson, Edwin, et al.	
	WO-2014/137907A2	9/12/2014	Olson, Edwin S, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 11/209,163, Advisory Action mailed 04-21-08", 3 pgs.		
	"Application Serial No. 11/209,163, Final Office Action mailed 01-23-08", 20 pgs		
	"Application Serial No. 11/209,163, Non Final Office Action mailed 08-13-07", 14 pgs.		
	"Application Serial No. 11/209,163, Notice of Allowance mailed 07-14-08", 7 pgs		
	"Application Serial No. 11/209,163, Preliminary Amendment filed 02-27-07", 9 pgs		
	"Application Serial No. 11/209,163, Response filed 03-24-08 to Final Office Action mailed 01-23-08", 29 pgs		
	"Application Serial No. 11/209,163, Response filed 07-09-07 to Restriction Requirement mailed 06-07-07", 2 pgs		
	"Application Serial No. 11/209,163, Response filed 11-13-07 to Non Final Office Action mailed 08-13-07", 19 pgs		
	"Application Serial No. 11/209,163, Restriction Requirement mailed 06-07-07", 6 pgs		
	"Application Serial No. 12/201,595, Final Office Action mailed 03-10-10", 13 pgs.		

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 5 of 9	Attorney Docket No: 3338.005US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 12/201,595, Non Final Office Action mailed 04-16-09", 21 pgs.	
	"Application Serial No. 12/201,595, Response filed 10-16-09 to Non Final Office Action mailed 04-16-09", 18 pgs	
	"Application Serial No. 12/419,219, Final Office Action mailed 10-14-10", 17 pgs	
	"Application Serial No. 12/419,219, Non Final Office Action mailed 01-15-10", 13 pgs	
	"Application Serial No. 12/419,219, Non Final Office Action mailed 02-23-11", 17 pgs	
	"Application Serial No. 12/419,219, Non Final Office Action mailed 08-04-11", 16 pgs.	
	"Application Serial No. 12/419,219, Notice of Allowance Mailed 01-10-12", 7 pgs	
	"Application Serial No. 12/419,219, Preliminary Amendment filed 04-06-09", 7 pgs	
	"Application Serial No. 12/419,219, Response filed 02-14-11 to Final Office Action mailed 10-14-10", 19 pgs.	
	"Application Serial No. 12/419,219, Response filed 05-20-11 to Non Final Office Action mailed 02-23-11", 14 pgs	
	"Application Serial No. 12/419,219, Response filed 07-15-10 to Non Final Office Action mailed 01-15-10", 22 pgs	
	"Application Serial No. 12/419,219, Response filed 10-27-11 to Non Final Office Action mailed 08-04-11", 12 pgs	
	"Application Serial No. 13/427,665, Non Final Office Action mailed 01-04-13", 23 pgs.	
	"Application Serial No. 13/427,665, Non Final Office Action mailed 08-03-12", 12 pgs.	
	"Application Serial No. 13/427,665, Notice of Allowance mailed 04-16-13", 8 pgs	
	"Application Serial No. 13/427,665, Response filed 03-21-13 to Non Final Office Action mailed 01-04-13", 20 pgs	
	"Application Serial No. 13/427,665, Response filed 10-10-12 to Non Final Office Action mailed 08-03-12", 15 pgs	
	"Application Serial No. 13/427,685, Preliminary Amendment filed 03-22-12", 3 pgs	
	"Application Serial No. 13/453,274, Advisory Action mailed 11-24-14", 3 pgs	
	"Application Serial No. 13/453,274, Final Office Action mailed 10-16-14", 4 pgs	
	"Application Serial No. 13/453,274, Notice of Allowance mailed 01-05-15", 5 pgs	
	"Application Serial No. 13/453,274, Response filed 11-06-14 to Final Office Action mailed 10-16-14", 7 pgs.	
	"Application Serial No. 13/453,274, Response filed 12-09-14 to Advisory Action mailed 11-24-14", 6 pgs	
	"Application Serial No. 13/453,274, Non Final Office Action mailed 05-30-14", 6 pgs.	
	"Application Serial No. 13/453,274, Response filed 09-02-14 to Non Final Office Action mailed 05-30-14", 13 pgs.	
	"Application Serial No. 13/966,768, Non Final Office Action mailed 12-06-13", 7 pgs.	
	"Application Serial No. 13/966,768, Notice of Allowability mailed 08-01-14", 6 pgs	
	"Application Serial No. 13/966,768, Notice of Allowance mailed 04-18-14", 7 pgs	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 6 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 13/966,768, Preliminary Amendment filed 08-14-13", 3 pgs.	
	"Application Serial No. 13/966,768, Response filed 03-06-14 to Non Final Office Action mailed 12-06-13", 6 pgs.	
	"Application Serial No. 13/966,768, Supplemental Preliminary Amendment filed 08-15-13", 6 pgs.	
	"Application Serial No. 14/564,860, Preliminary Amendment filed 12-10-14", 6 pgs.	
	"Bromine and its Compounds", Jolles, Z. E., Editor, Academic Press, Inc., New York, NY, (1966), pgs. 193 and 205	
	"Canadian Application Serial No. 2,584,327, Office Action mailed 03-03-09", 4 pgs.	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 04-02-15", 5 pgs	
	"European Application Serial No. 05814011.2, Response filed 09-09-11 to European Search Report mailed 04-14-09 and Office Action mailed 11-05-09", 20 pgs.	
	"European Application Serial No. 05814011.2, Office Action mailed 01-25-08", 2 pgs.	
	"European Application Serial No. 05814011.2, Office Action mailed 11-05-09", 2 pgs.	
	"European Application Serial No. 05814011.2, Partial European Search Report mailed 04-14-09", 13 pgs.	
	"European Application Serial No. 05814011.2, Response filed 04-18-08 to Office Action mailed 01-25-08 and Third Party Observations submitted 12-04-07", 7 pgs.	
	"European Application Serial No. 05814011.2, Response filed 05-11-10 to Office Action mailed 11-05-09", 11 pgs.	
	"European Application Serial No. 05814011.2, Third Party Observations submitted 03-19-12", 7 pgs.	
	"European Application Serial No. 05814011.2, Third Party Observations submitted 12-04-07", 5 pgs.	
	"International Application Serial No. PCT/US2013/036964, International Preliminary Report on Patentability mailed 07-17-14", 11 pgs	
	"International Application Serial No. PCT/US2013/036964, Written Opinion mailed 04-15-14", 10 pgs	
	"International Application Serial No. PCT/US2013/036964, International Search Report mailed 11-29-13", 7 pgs	
	"International Application Serial No. PCT/US2013/036964, Invitation to Pay Additional Fees and Partial Search Report mailed 08-02-13", 7 pgs	
	"International Application Serial No. PCT/US2013/036964, Written Opinion mailed 11-29-13", 13 pgs	
	"International Application Serial No. PCT/US2014/019916, International Search Report mailed 10-13-14", 6 pgs.	
	"International Application Serial No. PCT/US2014/019916, Written Opinion mailed 10-13-14", 13 pgs.	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 7 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"International Application Serial No. PCT/US2014/019916, Invitation to Pay Additional Fees and Partial Search Report mailed 05-30-14", 6 pgs	
	BAKANDRITSOS, A., et al., "Aqueous and Gaseous Adsorption from Montmorillonite-Carbon Composites and from Derived Carbons", <u>Langmuir</u> , 21, (2005), 2349-2355	
	BAKANDRITSOS, A., et al., "High Surface Area Montmorillonite - Carbon Composites and Derived Carbons", <u>Chemistry of Materials</u> , Vol. 16, No. 8, (16 March 2004), 1551-1559	
	CHANG, SHIH-GER, "METHOD FOR OXIDATION OF MERCURY VAPOR", Provisional Application Serial No. 60/560,904, filed April 9, 2004, 9 pgs.	
	CRISWELL, GORDON, et al., "Progress Report on Mercury Control Retrofit at the Colstrip Power Station", Paper #91, Mega Symposium, Baltimore, MD, (August 2011), 1-23	
	DARDER, M., et al., "Caramel-clay nanocomposites", <u>Journal of Materials Chemistry</u> , 15, (2005), 3913-3918	
	DONG, J., et al., "Mercury Removal from Flue Gases by Novel Regenerable Magnetic Nanocomposite Sorbents", <u>Environ. Sci. Technol.</u> , 43, (2009), 3266-3271	
	DUNHAM, G. E., et al., "Mercury Capture by an Activated Carbon in a Fixed-Bed Bench-Scale System", <u>Environmental Progress</u> , 17(3), (1998), 203-208	
	EISAZADEH, H., "Removal of Mercury from Water Using Polypyrrole and its Composites", <u>Chinese Journal of Polymer Science</u> , 25(4), (2007), 393-397	
	FELSVANG, K., et al., "Mercury Reduction and Control Options", The U.S. EPA-DOE-EPRI Combined Power Plant Air Pollutant Control Symposium; The Mega Symposium and The A&WMA Specialty Conference and Mercury Emissions: Fate, Effects and Control; Chicago, IL, (August, 2001), 1-19	
	FERNANDEZ-SAAVEDRA, R., et al., "Polymer-Clay Nanocomposites as Precursors of Nanostructured Carbon Materials for Electrochemical Devices: Templating Effect of Clays", <u>Journal of Nanoscience and Nanotechnology</u> , 8, (2008), 1741-1750	
	GHORBANI, M., et al., "Application of polyaniline nanocomposite coated on rice husk ash for removal of Hg(II) from aqueous media", <u>Synthetic Metals</u> , (2001), 4 pgs.	
	GHORISHI, BEHROOZ, et al., "Sorption of Mercury Species by Activated Carbons and Calcium-Based Sorbents: Effect of Temperature, Mercury Concentration and Acid Gases", <u>Waste Manage. Res.</u> , 16:6, (1998), 582-593	
	GOMEZ-AVILES, A., et al., "Functionalized Carbon-Silicates from Caramel-Sepiolite Nanocomposites", <u>Angew. Chem. Int. Ed.</u> , 46, (2007), 923-925	
	GOMEZ-AVILES, A., et al., "Multifunctional materials based on graphene-like/sepiolite nanocomposites", <u>Applied Clay Science</u> , 47, (2010), 203-211	
	IKEUE, K., et al., "Noble-metal-containing nanoporous carbon synthesized within the interlayer space of montmorillonite and its catalytic property", <u>Applied Catalysis A: General</u> , 351, (2008), 68-74	
	KYOTANI, T., et al., "Formation of highly orientated graphite from polyacrylonitrile by using a two-dimensional space between montmorillonite lamellae", <u>Nature</u> , 331, (1988), 331-333	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 8 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	LANCIA, A., et al., "Adsorption of Mercuric Chloride Vapours from Incinerator Flue Gases on Calcium Hydroxide Particles", <u>Combust. Sci. & Tech.</u> , 93, (1993), 277-289	
	LAUMB, JASON D., et al., "X-ray photoelectron spectroscopy analysis of mercury sorbent surface chemistry", <u>Fuel Processing Technology</u> , 85, (2004), 577-585	
	LI, Y., et al., "Removal of elemental mercury from simulated coal-combustion flue gas using a SiO ₂ -TiO ₂ nanocomposite", <u>Fuel Processing Technology</u> , 89, (2008), 567-573	
	MOCHIDA, I., et al., "Preparation of nitrogen containing pitches from quinoline and isoquinoline by AID of AlCl ₃ ", <u>Carbon</u> , 33(8), (1995), 1069-1077	
	NGUYEN-THANH, D., et al., "High Porosity Carbonaceous Adsorbents Templated From Porous Clay Heterostructures", <u>Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.</u> , 51(1), (2006), 7-8	
	NGUYEN-THANH, D., et al., "Metal-loaded carbonaceous adsorbents templated from porous clay heterostructures", <u>Microporous and Mesoporous Materials</u> , 92, (2006), 47-55	
	OLSON, DAVID G., et al., "The Reduction of Gas Phase Air Toxics from Combustion and Incineration Sources using the MET-Mitsui-BF Activated Coke Process", <u>Fuel Processing Technology</u> , 65-66, (2000), 393-405	
	OLSON, E. S., et al., "Catalytic effects of carbon sorbents for mercury capture", <u>Journal of Hazardous Materials</u> , 74, (2000), 61-79	
	OLSON, EDWIN S., et al., "Surface Compositions of Carbon Sorbents Exposed to Simulated Low-Rank Coal Flue Gases", <u>J. Air & Water Waste Manage. Assoc.</u> , 55, (2005), 747-754	
	VOSTEEN, B, et al., "Chlor- und Bromgestutzte Hg-Sorption an Elektrofilter-Flugaschen eines kohlegefeuerten Schmelzkammerkessels und an Zementrohmehl", <u>Matin-Luther-Universitat Halle-Wittenberg</u> , (2003), 1-30	
	VOSTEEN, B. W., et al., "", <u>Flyer on Mercury Abatement given at the VDI-Wissensforum, Dusseldorf, Germany</u> , (2003), 6 pgs.	
	VOSTEEN, B. W., "Bromine-enhanced Mercury Abatement from Combustion Flue Gases - Recent Industrial Applications and Laboratory Research", <u>VGB PowerTech, Vol. 86, Issue 3/2006</u> , (2006), 70-75	
	VOSTEEN, N., "Emissionsminderung von Quecksilber durch chlor- und bromgestutzte Hg-Oxidation in Rauchgas", (September 2003), 1-23	
	WAN, Q., et al., "Removal of gaseous elemental mercury over a CeO ₂ -WO ₃ /TiO ₂ nanocomposite in simulated coal-fired flue gas", <u>Chemical Engineering Journal</u> , 170, (2011), 512-517	
	WANG, B., et al., "Performance of a diatomite-based sorbent in removing mercury from aqueous and oil matrices", <u>J. Environ. Eng. Sci.</u> , 6, (2007), 469-476	
	ZHANG, Y., et al., "High efficient removal of mercury from aqueous solution by polyaniline/humic acid nanocomposite", <u>Journal of Hazardous Materials</u> , 175, (2010), 404-409	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 9 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	ZHAO, YONGXIN, et al., "Effectsof Sulfur Dioxide and Nitric Oxide on Mercury Oxidation and Reducton under Homogeneous Conditions", <u>J. Air & Waste Manage. Assoc.</u> 56, (2006), 628-635	
	ZHENG, YUANJING, et al., "Review of technologies for mercury removal from flue gas from cement production processes", <u>Progress in Energy and Combustion Science</u> , Vol. 38, No. 5, (26 April 2012), 599-629	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	23275186
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Adam Kiedrowski/James Kanyusik
Filer Authorized By:	Adam Kiedrowski
Attorney Docket Number:	3338.005US7
Receipt Date:	21-AUG-2015
Filing Date:	14-MAY-2015
Time Stamp:	12:40:01
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		IDS_CCCA_3338_005US7.PDF	267272 e6df4df92999104b3f1d3388194ab256c1974691c	yes	14

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	1	
	Miscellaneous Incoming Letter		2	3	
	Transmittal Letter		4	5	
	Information Disclosure Statement (IDS) Form (SB08)		6	14	
Warnings:					
Information:					
2	Foreign Reference	0001_wo2013162968a3.pdf	55214 9f6c24f6e46a833cb19036ce02b2fa5c3de19823	no	8
Warnings:					
Information:					
3	Foreign Reference	0002_wo2014137907a2.pdf	433227 84bb0ae526885106e8f4192088a71536e8e77e38	no	62
Warnings:					
Information:					
4	Non Patent Literature	0003_advisory_action_11_24_14.pdf	720172 92c2670cdda82ca4f966f5f530ce6fa4b88e26a8	no	3
Warnings:					
Information:					
5	Non Patent Literature	0004_final_oa_10_16_2014.pdf	785112 957ea38cc0d86194f919d2ca0ae2b13106ac0d3b	no	4
Warnings:					
Information:					
6	Non Patent Literature	0005_noa_01_05_15.pdf	1592075 d1241165dfd016beda2df3a72f5ac5836a1a3ed	no	5
Warnings:					
Information:					
7	Non Patent Literature	0006_amend_response_110614.pdf	117087 94dd81ad3899380cccd57e2e166795f5e5e1f32	no	7
Warnings:					
Information:					

8	Non Patent Literature	0007_response_12_9_2014.pdf	106545	no	6
			25c388f17597c22640e473549d3e61a4eaf916bf		
Warnings:					
Information:					
9	Non Patent Literature	0008_prel_amend_12_10_14.pdf	88518	no	6
			e18b649b7bf13208b91b75fd40ee8aa91f219f74		
Warnings:					
Information:					
10	Non Patent Literature	0009_ca_office_action_04_02_15.pdf	931852	no	5
			823effce4dd931b87ef7b0d61482b6541ff95e06		
Warnings:					
Information:					
11	Non Patent Literature	0010_iprp_07_17_14.pdf	2353232	no	11
			91046840a67b8d524dca883ee3f78e0fc9b96e9c		
Warnings:					
Information:					
12	Non Patent Literature	0011_written_opinion_04_15_14.pdf	1899123	no	10
			2390d14d0eda0db9d7fdb8d863ea1d18749d9ee6		
Warnings:					
Information:					
13	Non Patent Literature	0012_inter_sr_10_13_2014.pdf	1008812	no	6
			8176f07b0a1bb208bc9bb1540b2638d011e9e26c		
Warnings:					
Information:					
14	Non Patent Literature	0013_written_opinion_10_13_2014.pdf	2060724	no	12
			25e5a5fedfcdcbet4c5c3a1d651cd0407fa6a7ce4		
Warnings:					
Information:					
Total Files Size (in bytes):			12418965		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 3338.005US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Unknown

Group Art Unit: Unknown

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

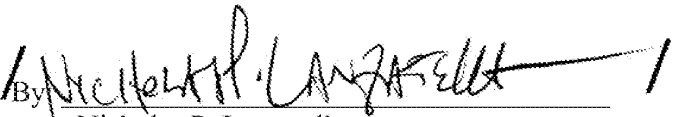
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Communication Concerning Prior and Copending Applications (2 pgs.)
- ☒ Information Disclosure Statement (2 pgs.), Form 1449 (9 pgs.) Copies of Cited References (13).
- Other Documents NOT enclosed, cited in Parent Application.

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By 

Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Unknown

Serial No.: 14/712,558

Group Art Unit: Unknown

Filed: May 14, 2015

Docket: 3338.005US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPEING APPLICATIONS

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional applications to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
11/209,163 7,435,286	August 22, 2005	3338.005US1	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
12/201,595	August 29, 2008	3338.005US2	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
12/419,219 8,168,147	April 6, 2009	3338.005US3	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
13/427,665 8,512,655	March 22, 2012	3338.005US4	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
13/966,768 8,821,819	August 14, 2013	3338.005US5	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
14/318,270	June 27, 2014	3338.005US6	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPEING APPLICATIONS

Serial Number:14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 3338.005US7

14/195,360 March 3, 2014 3338.021US1 ACTIVATED CARBON SORBENT
INCLUDING NITROGEN AND
METHODS OF USING THE SAME

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

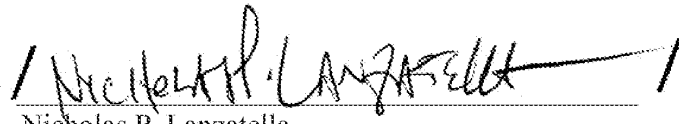
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date August 21, 2015

By



Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Unknown

Serial No.: 14/712,558

Group Art Unit: Unknown

Filed: May 14, 2015

Docket: 3338.005US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed after filing of the application, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 19-0743 in order to have this Information Disclosure Statement considered.

Pursuant to 37 C.F.R. § 1.98(d), Applicant has not provided copies of the listed documents that were previously cited by or submitted to the U.S. Patent Office in connection with Applicant's prior U.S. application, Serial No. 14/318,270, filed on June 27, 2014, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

INFORMATION DISCLOSURE STATEMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 3338.005US7

Copies of thirteen (13) documents, not previously cited by or submitted to the U.S. Patent Office in connection with Applicant's prior U.S. application, Serial No. 14/318,270, are attached. These documents are highlighted in boldface on the attached PTO 1449 Forms (pages 4, 5, and 6).

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

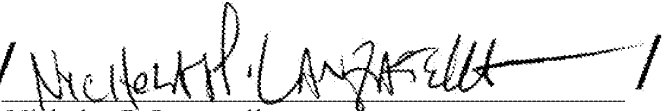
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date August 21, 2015

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:jek



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/712,558	05/14/2015	Edwin S. Olson	3338.005US7

CONFIRMATION NO. 1934

PUBLICATION NOTICE

21186

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402



OC000000077245334

Title:SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Publication No.US-2015-0246315-A1

Publication Date:09/03/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 2	Attorney Docket No: 3338.005US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20090235848A1	9/24/2009	Eiteneer, Boris Nikolaevich, et al.
	US-20110076210A1	3/31/2011	Pollack, Nicholas R, et al.
	US-2014/0224121A1	8/14/2014	Mimna, Richard A., et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	JP-54004868B	1/13/1979	Seki, Michihari, et al.	
	SU-732207A1	5/5/1980	Valueva, Svetlana P, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 14/195,360, Final Office Action mailed 03-18-16", 18 pgs	
	"Application Serial No. 14/195,360, Non Final Office Action mailed 06-20-16", 11 pgs	
	"Application Serial No. 14/195,360, Non Final Office Action mailed 06-20-16", 11 pgs	
	"Application Serial No. 14/195,360, Non Final Office Action mailed 11-24-15", 19 pgs	
	"Application Serial No. 14/195,360, Response filed 02-22-16 to Non Final Office Action mailed 11-24-15", 21 pgs.	
	"Application Serial No. 14/195,360, Response filed 05-17-16 to Final Office Action mailed 03-18-16", 15 pgs	
	"Application Serial No. 14/318,270, Non Final Office Action mailed 06-02-16", 24 pgs	
	"Application Serial No. 14/318,270, Response filed 03-02-16 to Restriction Requirement mailed 01-14-16", 9 pgs.	
	"Application Serial No. 14/318,270, Response filed 08-22-16 to Non Final Office Action mailed 06-02-16", 14 pgs.	
	"Application Serial No. 14/318,270, Restriction Requirement mailed 01-14-16", 8 pgs	
	"Application Serial No. 14/195,360, Response filed 09-16-16 to Non Final Office Action mailed 06-30-16", 12 pgs.	
	ARENILLAS, A, et al., "CO2 removal potential of carbons prepared by co-pyrolysis of sugar and nitrogen containing compounds", Journal of analytical and applied pyrolysis 74.1, (2005), 298-306	
	BIMER, JAN, et al., "Modified active carbons from precursors enriched with nitrogen functions: sulfur removal capabilities". (1998), 519-525	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 2 of 2		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	DIAMANTOPOULOU, LR G SKODRAS, et al., "Sorption of mercury by activated carbon in the presence of flue gas components", Fuel Processing Technology 91.2, (2010), 158-163	
	KAWABUCHI, YUJI, et al., "Chemical vapor deposition of heterocyclic compounds over active carbon fiber to control its porosity and surface function", Langmuir 13.8, (1997), 2314-2317	
	NICKELS, DALE L, et al., "Processing and reuse of activated carbon used to adsorb mercury from power plant flue gases", Final report, (2004)	
	RACHEL, RIBEIROVIEIRA AZZI RIOS, et al., "Tailoring Activated Carbon by Surface Chemical Modification with O, S, and N Containing Molecules", Materials Research. 6 (2), (2003), 129-135	
	RAYMUNDO-PINERO, E, et al., "Structural characterization of N-containing activated carbon fibers prepared from a low softening point petroleum pitch and a melamine resin", Carbon 40.4, (2002), 597-608	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	27055083
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	James Lee Shands/Jeanne Frenning
Filer Authorized By:	James Lee Shands
Attorney Docket Number:	3338.005US7
Receipt Date:	28-SEP-2016
Filing Date:	14-MAY-2015
Time Stamp:	11:17:00
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		14712558_SIDS_9-28-16.pdf	198663	yes	5
			37cc4480b3f9cbc746b8b5745023a38a8b3d662b		

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Miscellaneous Incoming Letter		1	1	
	Transmittal Letter		2	3	
	Information Disclosure Statement (IDS) Form (SB08)		4	5	
Warnings:					
Information:					
2	Foreign Reference	0001_jp_54004868_b.pdf	49658	no	1
			4d717ac51fce6630936c9eec3e2a7c076561be91		
Warnings:					
Information:					
3	Foreign Reference	0002_su732207a1.pdf	776266	no	11
			08c3fadb06a35a10725b0cbd1ac13152933c45fa		
Warnings:					
Information:					
4	Non Patent Literature	0003_3338021us1_foar_031816.pdf	1635551	no	18
			dc3457d5bf66cab36916b9be396a400e4b7ba392		
Warnings:					
Information:					
5	Non Patent Literature	0004_3338021us1_oarn_062016.pdf	1021890	no	11
			145b26110cc4e216a80a3ea2138e1a0c497332fd		
Warnings:					
Information:					
6	Non Patent Literature	0005_pages_from_14195360oarrnonfinal_office_action_received20160620.pdf	1301886	no	11
			3b8c874dcd4f17db00c015b137d541f94a165e55		
Warnings:					
Information:					

7	Non Patent Literature	0006_3338021us1_oarn_112415.pdf	1707161	no	19
			131a14b6eaa1987e43b441b64ce1223e9eff62fc		
Warnings:					
Information:					
8	Non Patent Literature	0007_3338021us1_aarn_022216.pdf	290045	no	21
			67a15dd2d1c3677ef98d1d6f06889d38dc8e4a9a		
Warnings:					
Information:					
9	Non Patent Literature	0008_3338021us1_aarf_051716.pdf	2065533	no	15
			1edd0c006f54be15ccc37ef15e98df03c9244a04		
Warnings:					
Information:					
10	Non Patent Literature	0009_3338005us6_oarn_060216.pdf	2397878	no	24
			3d2dc882cb275f6d3d9ee2d9a8135ae56d98f5bf		
Warnings:					
Information:					
11	Non Patent Literature	0010_3338005us6_rrr1mo_030216.pdf	169957	no	9
			2c27dc15001de0a5efe6aa42fa8808d3ad7ca6e		
Warnings:					
Information:					
12	Non Patent Literature	0011_3338005us6_aarn_082216.pdf	126360	no	14
			91ddff6b2442aeca84f24870d9b3cda0dd0eb9b9		
Warnings:					
Information:					
13	Non Patent Literature	0012_3338005us6_rerr_011416.pdf	784360	no	8
			9dd3d1ab368fc50da79bd1d5024e420709202b5d		
Warnings:					
Information:					

14	Non Patent Literature	0013_3338021us1_aarn_091616.pdf	109506	no	12
			4aed4e335ee6a2a0345bdfa5e0b1f60f8f980520		
Warnings:					
Information:					
15	Non Patent Literature	0014_14195360_co2_removal_potential_of_carbons_prepared.pdf	1515184	no	9
			9485d2e138ead48c6050557e5c3296cf4510782e		
Warnings:					
Information:					
16	Non Patent Literature	0015_141953602.pdf	1620505	no	7
			325aa7f4190c1d2c3362b68491e0025ef1453e8e		
Warnings:					
Information:					
17	Non Patent Literature	0016_14195360_sorption_of_mercury_by_activated_carbon.pdf	1284204	no	6
			1c9bad07cb69f5ecf0b4462ee0ee99451b4125f2		
Warnings:					
Information:					
18	Non Patent Literature	0017_14195360.pdf	819908	no	4
			33760252560380ede181be6ff4e8628718e30174e		
Warnings:					
Information:					
19	Non Patent Literature	0018_141953604.pdf	3074153	no	36
			2112c500a40f8e074291dc0c190a71eac25376c7		
Warnings:					
Information:					
20	Non Patent Literature	0019_141953603.pdf	1170253	no	7
			9d5182fa43124880a484d1e0ebfad21f778a212f		
Warnings:					
Information:					

21	Non Patent Literature	0020_14195360_structural_characterization_of__n_taining.pdf	1883422	no	12
			452e16ea73d6e869b24b228a866f64b2a33562d4		
Warnings:					
Information:					
Total Files Size (in bytes):				24002343	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 3338.005US7

Filed: May 14, 2015

Examiner: Unknown

Customer No.: 21186

Serial No.: 14/712,558

Due Date: N/A

Group Art Unit: Unknown

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

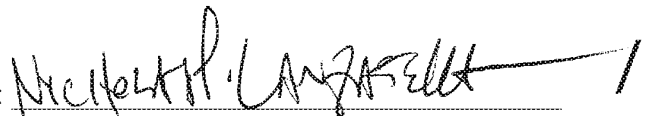
☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (2 pgs.) Copies of Cited References (20).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By:


Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Edwin S. Olson et al.	Examiner:	Unknown
Serial No.:	14/712,558	Group Art Unit:	Unknown
Filed:	May 14, 2015	Docket:	3338.005US7
Customer No.:	21186	Confirmation No.:	1934
Title:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed after filing of the application or after the filing of the most recent RCE, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 19-0743 in order to have this Information Disclosure Statement considered.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

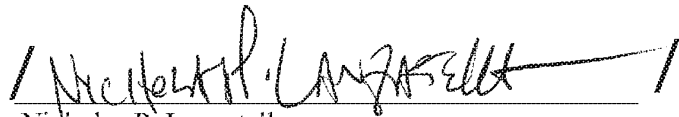
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date September 28, 2016

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:jmf

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

POWER OF ATTORNEY BY APPLICANT

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

Application Number

14/712,558

Filing Date

May 14, 2015

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

21186

OR

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

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

- ☒ The address associated with the above mentioned Customer Number.

OR

- ☐ The address associated with Customer Number:

OR

☐ Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

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

Energy & Environmental Research Center Foundation

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

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

Signature

Date

(Optional)

12/8/16

Name

Title

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

- ☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

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

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Energy & Environmental Research Center Foundation

Application No./Patent No.: 14/712,558 Filed/Issue Date: May 14, 2015

Titled: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Energy & Environmental Research Center Foundation a Corporation
 (Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
 - ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
 - ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 040496, Frame 0211 - 0217, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: John Henry Pavlish To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040495, Frame 0857 - 0863, or for which a copy thereof is attached.

2. From: Michael J. Holmes To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040496, Frame 0056 - 0062, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Edwin S. Olson To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at
 Reel 040496, Frame 0211 - 0217, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature

Nicholas P. Lanzatella
 Printed or Typed Name

December 14, 2016
 Date

USPTO Reg. No. 63,803
 Title or Registration Number

Electronic Acknowledgement Receipt

EFS ID:	27796952
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Mark Victor Muller/Jacqueline Pennington
Filer Authorized By:	Mark Victor Muller
Attorney Docket Number:	3338.005US7
Receipt Date:	14-DEC-2016
Filing Date:	14-MAY-2015
Time Stamp:	17:14:34
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		3338005US7POA.pdf	362016	yes	4
			af00a94de0a2d75e489eb469792234a1ed60e734		

Multipart Description/PDF files in .zip description			
	Document Description	Start	End
	Transmittal Letter	1	1
	Power of Attorney	2	2
	Assignee showing of ownership per 37 CFR 3.73	3	4
Warnings:			
Information:			
Total Files Size (in bytes):		362016	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 3338.005US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Unknown

Group Art Unit: 1736

Customer No.: 21186

Confirmation No.: 1934

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

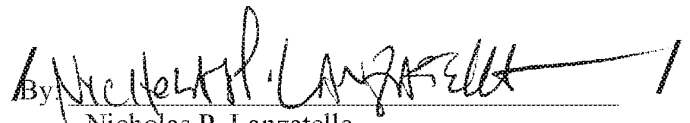
X Power of Attorney (1 pg)

X Statement Under 37 CFR 3.73(c) (2 pgs)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
USPTO Reg. No. 63,803



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/712,558	05/14/2015	Edwin S. Olson	3338.005US7

CONFIRMATION NO. 1934

POA ACCEPTANCE LETTER



OC000000087951046

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

Date Mailed: 12/19/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/14/2016.

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

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

/ytferra/



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	3338.005US7	1934
21186	7590	07/06/2017		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			07/06/2017	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):

uspto@slwip.com
SLW@blackhillsip.com

Office Action Summary	Application No. 14/712,558	Applicant(s) OLSON ET AL.	
	Examiner AMBER R. ORLANDO	Art Unit 1776	AIA (First Inventor to File) Status No

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

Period for Reply

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

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

Status

- 1) ☒ Responsive to communication(s) filed on 05/27/2015.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 2-21 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) 2-21 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 05/14/2015 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)	3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____.
2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date ____.	4) ☐ Other: ____.

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

DETAILED ACTION

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, 365(c), or 386(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosure of the prior-filed application, Application No. 14/318270, fails to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. Claims 2-20, combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof and subsequently reacting the promoter with particulate sorbent material (claim 2) and subsequent claimed subject matter of claims 3-5 which pertain

the coal comprising at promoter are not disclosed within the prior-filed application.

Claims 6-20 depend from claim 2. Claim 21, the limitation "adding a promoter to coal, wherein the promoter is chosen from Br₂, HBr, and combinations thereof: combusting the coal to form the mercury-containing gas" and subsequently reacting the promoter with particulate sorbent material are not disclosed within the prior-filed application

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: Claims 2-20, the limitation "combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof" (claim 2) and subsequently reacting the promoter with particulate sorbent material and subsequent claimed subject matter of claims 3-5 which pertain the coal comprising at promoter are not disclosed within the specification. Claims 6-20 depend from claim 2. Claim 21, the limitation "adding a promoter to coal, wherein the promoter is chosen from Br₂, HBr, and combinations thereof: combusting the coal to form the mercury-containing gas" and subsequently reacting the promoter with particulate sorbent material are not disclosed within the specification.

Claim Rejections - 35 USC § 112

Claims 2-21 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 does enable the claim limitations of combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof" (claim 2) and subsequent claimed subject matter of claims 3-5 which pertain the coal comprising at promoter are not disclosed within the specification. Claims 6-20 depend from claim 2. As well as the limitation of claim 21, "adding a promoter to coal, wherein the promoter is chosen from Br_2 , HBr, and combinations thereof: combusting the coal to form the mercury-containing gas".

The nature of the invention is unknown as it is not known how the coal comprises a promoter, or how the promoter is added to coal. Further it is not known how coal can be combusted, and then from that reaction product react a promoter with a particulate sorbent material to form a promoted sorbent material.

The state of the prior art does not disclose coal comprising a promoter, or combusting the coal with the promoter, and then from that reaction product react a promoter with a particulate sorbent material to form a promoted sorbent material.

The level of one having ordinary skill in the art is low as it is unknown how the coal is combined with the promoter, how the promoter reacts when subjected to the combustion product of coal, nor how the reaction product of the combustion process will react with a particulate sorbent material to form a promoted sorbent material

There is no predictability in the art, as it is unknown how the coal is combined with the promoter, how the promoter reacts when subjected to the combustion product

of coal, nor how the reaction product of the combustion process will react with a particulate sorbent material to form a promoted sorbent material.

There is no direction provided by the inventor as the specification lacks antecedent basis for the claimed subject matter as specified above.

There are no existing working example as the specification lacks antecedent basis for the claimed subject matter as specified above.

The quantity of experimentation needed to use the invention based on the content of the disclosure is high as the specification lacks antecedent basis for the claimed subject matter as specified above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER R. ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Mon.-Thurs. (6:30-5:00).

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, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776



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. 1934

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/712,558	05/14/2015	423	1776	3338.005US7
RULE				

APPLICANTS
 Energy & Environmental Research Center Foundation, Grand Forks, ND;

INVENTORS
 Edwin S. Olson, Grand Forks, ND;
 Michael J. Holmes, Thompson, ND;
 John Henry Pavlish, East Grand Forks, MN;

**** CONTINUING DATA *******
 This application is a CON of 14/318,270 06/27/2014
 which is a CON of 13/966,768 08/14/2013 PAT 8821819
 which is a CON of 13/427,665 03/22/2012 PAT 8512655
 which is a CON of 12/419,219 04/06/2009 PAT 8168147
 which is a CON of 12/201,595 08/29/2008 ABN
 which is a DIV of 11/209,163 08/22/2005 PAT 7435286
 which claims benefit of 60/605,640 08/30/2004

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
 05/26/2015

Foreign Priority claimed ☐ Yes ☒ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met ☐ Yes ☒ No		ND	10	20	2
Verified and /AMBER ROSE ORLANDO/ Acknowledged Examiner's Signature	Initials				

ADDRESS
 SCHWEGMAN LUNDBERG & WOESSNER, P.A.
 P.O. BOX 2938
 MINNEAPOLIS, MN 55402
 UNITED STATES

TITLE
 SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

FILING FEE RECEIVED 1600	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees
		☐ 1.16 Fees (Filing)
		☐ 1.17 Fees (Processing Ext. of time)
		☐ 1.18 Fees (Issue)
		☐ Other _____
		☐ Credit

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 2	Attorney Docket No: 3338.005US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20090235848A1	9/24/2009	Eiteneer, Boris Nikolaevich, et al.
	US-20110076210A1	3/31/2011	Pollack, Nicholas R, et al.
	US-2014/0224121A1	8/14/2014	Mimna, Richard A., et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	JP-54004868B	1/13/1979	Seki, Michihari, et al.	
	SU-732207A1	5/5/1980	Valueva, Svetlana P, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 14/195,360, Final Office Action mailed 03-18-16", 18 pgs		
	"Application Serial No. 14/195,360, Non Final Office Action mailed 06-20-16", 11 pgs		
	"Application Serial No. 14/195,360, Non Final Office Action mailed 06-20-16", 11 pgs		
	"Application Serial No. 14/195,360, Non Final Office Action mailed 11-24-15", 19 pgs		
	"Application Serial No. 14/195,360, Response filed 02-22-16 to Non Final Office Action mailed 11-24-15", 21 pgs.		
	"Application Serial No. 14/195,360, Response filed 05-17-16 to Final Office Action mailed 03-18-16", 15 pgs		
	"Application Serial No. 14/318,270, Non Final Office Action mailed 06-02-16", 24 pgs		
	"Application Serial No. 14/318,270, Response filed 03-02-16 to Restriction Requirement mailed 01-14-16", 9 pgs.		
	"Application Serial No. 14/318,270, Response filed 08-22-16 to Non Final Office Action mailed 06-02-16", 14 pgs.		
	"Application Serial No. 14/318,270, Restriction Requirement mailed 01-14-16", 8 pgs		
	"Application Serial No. 14/195,360, Response filed 09-16-16 to Non Final Office Action mailed 06-30-16", 12 pgs.		
	ARENILLAS, A, et al., "CO2 removal potential of carbons prepared by co-pyrolysis of sugar and nitrogen containing compounds", Journal of analytical and applied pyrolysis 74.1, (2005), 298-306		
	BIMER, JAN, et al., "Modified active carbons from precursors enriched with nitrogen functions: sulfur removal capabilities", (1998), 519-525		

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 2 of 2	Attorney Docket No: 3338.005US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	DIAMANTOPOULOU, LR G SKODRAS, et al., "Sorption of mercury by activated carbon in the presence of flue gas components", Fuel Processing Technology 91.2, (2010), 158-163	
	KAWABUCHI, YUJI, et al., "Chemical vapor deposition of heterocyclic compounds over active carbon fiber to control its porosity and surface function", Langmuir 13.8, (1997), 2314-2317	
	NICKELS, DALE L, et al., "Processing and reuse of activated carbon used to adsorb mercury from power plant flue gases", Final report, (2004)	
	RACHEL, RIBEIROVIEIRA AZZI RIOS, et al., "Tailoring Activated Carbon by Surface Chemical Modification with O, S, and N Containing Molecules", Materials Research. 6 (2), (2003), 129-135	
	RAYMUNDO-PINERO, E, et al., "Structural characterization of N-containing activated carbon fibers prepared from a low softening point petroleum pitch and a melamine resin", Carbon 40.4, (2002), 597-608	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O./

S/N 14/712,558PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Unknown

Serial No.: 14/712,558

Group Art Unit: Unknown

Filed: May 14, 2015

Docket: 3338.005US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPENDING APPLICATIONS

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional applications to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
11/209,163 7,435,286	August 22, 2005	3338.005US1	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
12/201,595	August 29, 2008	3338.005US2	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
12/419,219 8,168,147	April 6, 2009	3338.005US3	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
13/427,665 8,512,655	March 22, 2012	3338.005US4	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
13/966,768 8,821,819	August 14, 2013	3338.005US5	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
14/318,270	June 27, 2014	3338.005US6	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

/AMBER R ORLANDO/

06/27/2017

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

COMMUNICATION CONCERNING PRIOR OR COPENDING APPLICATIONS

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 3338.005US7

14/195,360 March 3, 2014 3338.021US1 ACTIVATED CARBON SORBENT
INCLUDING NITROGEN AND
METHODS OF USING THE SAME

/AMBER R ORLANDO/

06/27/2017

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

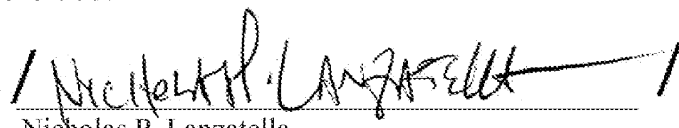
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date August 21, 2015

By



Nicholas P. Lanzatella

Reg. No. 63,803

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-2001/0002387A1	5/31/2001	Tsutsumi, Yoshio, et al.
	US-2001/0003116A1	6/7/2001	Neufert, Ronald
	US-2002/0043496A1	4/18/2002	Boddu, Veera M., et al.
	US-2002/0134242A1	9/26/2002	Yang, Ralph T, et al.
	US-2002/0150516A1	10/17/2002	Pahlman, John, et al.
	US-2003/0104937A1	6/5/2003	Sinha, R. K.
	US-2003/0136509A1	7/24/2003	Virtanen, Jorma
	US-2004/0003716A1	1/8/2004	Nelson Jr, Sidney
	US-2004/0013589A1	1/22/2004	Vosteen, Bernhard, et al.
	US-2004/0076570A1	4/22/2004	Jia, Charles Q
	US-2005/0019240A1	1/27/2005	Lu, Xiao-chun, et al.
	US-2006/0048646A1	3/9/2006	Olson, Edwin S, et al.
	US-2006/0191835A1	8/31/2006	Petrik, Viktor I, et al.
	US-2008/0090951A1	4/17/2008	Mao, Dongsheng, et al.
	US-2008/0182747A1	7/31/2008	Sinha, R. K.
	US-2008/0292512A1	11/27/2008	Kang, Shin G.
	US-2009/0062119A1	3/5/2009	Olson, Edwin S., et al.
	US-2009/0136401A1	5/28/2009	Yang, Xiaolin David, et al.
	US-2009/0320678A1	12/31/2009	Chang, Ramsay, et al.
	US-2010/0047146A1	2/25/2010	Olson, Edwin S., et al.
	US-2011/0168018A1	7/14/2011	Mohamadalizadeh, Ali, et al.
	US-2012/0183458A1	7/19/2012	Olson, Edwin S, et al.
	US-2013/0280156A1	10/24/2013	Olson, Edwin S, et al.
	US-2014/0056787A1	2/27/2014	Olson, Edwin S, et al.
	US-2014/0255279A1	9/11/2014	Olson, Edwin S, et al.
	US-2014/0308188A1	10/16/2014	Olson, Edwin S, et al.
	US-2015/0098878A1	4/9/2015	Olson, Edwin S
	US-1,984,164	12/11/1934	Alfred, Stock
	US-2,317,857	4/27/1943	Soday, Frank J
	US-3,194,629	7/13/1965	Dreibelbis, John A, et al.
	US-3,662,523	5/16/1972	Revoir, William H, et al.
	US-3,786,619	1/22/1974	Meikersson, Karl-axel
	US-3,826,618	7/30/1974	Capuano, Italo A
	US-3,849,267	11/19/1974	Hilgen, Hendrika, et al.
	US-3,876,393	4/8/1975	Kasai, Juichi, et al.
	US-4,094,777	6/13/1978	Sugier, Andre, et al.
	US-4,101,631	7/18/1978	Ambrosini, Ronald Frank, et al.

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 2 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-4,196,173	4/1/1980	deJong, Geert J, et al.
	US-4,338,896	7/13/1982	Papasideris, Stamos I.
	US-4,500,327	2/19/1985	Nishino, Hirosh, et al.
	US-4,708,853	11/24/1987	Matviya, Thomas, et al.
	US-4,786,483	11/22/1988	Audeh, Costandi A
	US-4,814,152	3/21/1989	Yan, Tsoung Y
	US-4,820,318	4/11/1989	Chang, Chin-hsiung, et al.
	US-4,889,698	12/26/1989	Moller, Jens, et al.
	US-4,956,162	9/11/1990	Smith, et al.
	US-5,300,137	4/5/1994	Weyand, Thomas E., et al.
	US-5,336,835	8/9/1994	McNamara, James D.
	US-5,409,522	4/25/1995	Durham, Michael D, et al.
	US-5,462,908	10/31/1995	Liang, Septimus -C H, et al.
	US-5,505,766	4/9/1996	Chang, Ramsay
	US-5,575,982	11/19/1996	Reiss, Guenter, et al.
	US-5,607,496	3/4/1997	Brooks, Richard J
	US-5,672,323	9/30/1997	Bhat, Pervaje, et al.
	US-5,695,726	12/9/1997	Lerner, B.
	US-5,827,352	10/27/1998	Altman, Ralph, et al.
	US-5,891,324	4/6/1999	Ohtsuka, Kiyoto
	US-6,027,551	2/22/2000	Hwang, Jiann-Yang, et al.
	US-6,080,281	6/27/2000	Attia, Yosry A
	US-6,136,072	10/24/2000	Sjostrom, Sharon, et al.
	US-6,136,749	10/24/2000	Gadkaree, Kishor P, et al.
	US-6,214,304	4/10/2001	Rosenthal, Jurgen, et al.
	US-6,258,334	7/10/2001	Gadkaree, Kishor, et al.
	US-6,372,187	4/16/2002	Madden, Deborah A, et al.
	US-6,375,909	4/23/2002	Dangtran, Ky, et al.
	US-6,383,981	5/7/2002	Blankenship, Steven, et al.
	US-6,471,936	10/29/2002	Chen, Pin, et al.
	US-6,528,030	3/4/2003	Madden, Deborah A., et al.
	US-6,638,485	10/28/2003	Iida, Kozo, et al.
	US-6,808,692	10/26/2004	Oehr, Klaus H.
	US-6,818,043	11/16/2004	Chang, Ramsay, et al.
	US-6,848,374	2/1/2005	Srinivasachar, Srivats, et al.
	US-6,878,358	4/12/2005	Vosteen, Bernhard, et al.
	US-6,942,840	9/13/2005	Broderick, Thomas E

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 3 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-6,953,494	10/11/2005	Nelson Jr., Sidney, et al.
	US-6,960,329	11/1/2005	Sellakumar, Kumar M.
	US-7,081,434	7/25/2006	Sinha, Rabindra K.
	US-7,211,707	5/1/2007	Axtell, Holly C, et al.
	US-7,435,286	10/14/2008	Olson, Edwin S, et al.
	US-7,479,263	1/20/2009	Chang, Shih-ger, et al.
	US-7,514,052	4/7/2009	Lissianski, Vitali Victor, et al.
	US-7,521,032	4/21/2009	Honjo, Shintaro, et al.
	US-7,544,338	6/9/2009	Honjo, S., et al.
	US-7,563,311	7/21/2009	Graham, James R
	US-7,611,564	11/3/2009	Mcchesney, Joe, et al.
	US-7,622,092	11/24/2009	Honjo, S., et al.
	US-7,722,843	5/25/2010	Srinivasachar, S.
	US-7,767,174	8/3/2010	Lui, K., et al.
	US-7,780,765	8/24/2010	Srinivasachar S., et al.
	US-8,007,749	8/30/2011	Chang, Shih-ger, et al.
	US-8,168,147	5/1/2012	Olson, Edwin S, et al.
	US-8,168,149	5/1/2012	Gal, Eli, et al.
	US-8,216,535	7/10/2012	Pollack, Nicholas R, et al.
	US-8,512,655	8/20/2013	Olson, Edwin S, et al.
	US-8,652,235	2/18/2014	Olson, Edwin S, et al.
	US-8,821,819	9/2/2013	Olson, Edwin S, et al.
	US-9,011,805	4/21/2015	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-1099490A1	4/21/1981	DeJong, et al.	
	CA-2150529A1	12/29/1995	Scherer, Volker, et al.	
	CA-2400898A1	8/30/2001	Maes, Rudy J, et al.	
	DE-10233173A1 (w/ English Abstract)	2/12/2004	Vosteen, Bernhard, et al.	
	DE-202012003747U1 (w/ English Abstract)	11/15/2012	Bluecher GmbH	
	DE-3426059A1 (w/ English Abstract)	1/16/1986	Seipenbusch, Jurgen, et al.	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 4 of 9		Attorney Docket No: 3338.005US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	EP-0208490A1	1/14/1987	Moller, Jens Thousig, et al.	
	EP-1570894A1	9/7/2005	Lissianski, V. V.	
	FR-2529802 (w/ English Abstract)	1/13/1984	Pelosi, J., et al.	
	JP-49-043197B4 (w/ English Abstract)	11/19/1974	Yokota, Noriyuki, et al.	
	JP-49-053590A (w/ English Abstract)	5/24/1974	Nippon Soda Co.	
	JP-49-066592A	6/27/1974	Sumitomo Chem Co Ltd	
	JP-49-53593A	5/24/1974	Nippon Soda Co.	
	JP-50-006438B4	3/13/1975	Yokota, Noriyuki, et al.	
	JP-51-003386A	1/12/1976	Soya, Kensuke, et al.	
	SU-1163982A (w/ English Abstract)	6/30/1985	Belozarov, I. M.	
	WO-01/62368A1	8/30/2001	Maes, Rudy J, et al.	
	WO-2004/089501A2	10/21/2004	Mazyck, D. W., et al.	
	WO-2013/162968A2	10/31/2013	Olson, Edwin S, et al.	
	WO-2013/162968A3	10/31/2013	Olson, Edwin, et al.	
	WO-2014/137907A2	9/12/2014	Olson, Edwin S, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 11/209,163, Advisory Action mailed 04-21-08", 3 pgs.		
	"Application Serial No. 11/209,163, Final Office Action mailed 01-23-08", 20 pgs		
	"Application Serial No. 11/209,163, Non Final Office Action mailed 08-13-07", 14 pgs.		
	"Application Serial No. 11/209,163, Notice of Allowance mailed 07-14-08", 7 pgs		
	"Application Serial No. 11/209,163, Preliminary Amendment filed 02-27-07", 9 pgs		
	"Application Serial No. 11/209,163, Response filed 03-24-08 to Final Office Action mailed 01-23-08", 29 pgs		
	"Application Serial No. 11/209,163, Response filed 07-09-07 to Restriction Requirement mailed 06-07-07", 2 pgs		
	"Application Serial No. 11/209,163, Response filed 11-13-07 to Non Final Office Action mailed 08-13-07", 19 pgs		
	"Application Serial No. 11/209,163, Restriction Requirement mailed 06-07-07", 6 pgs		
	"Application Serial No. 12/201,595, Final Office Action mailed 03-10-10", 13 pgs.		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 5 of 9	Attorney Docket No: 3338.005US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 12/201,595, Non Final Office Action mailed 04-16-09", 21 pgs.	
	"Application Serial No. 12/201,595, Response filed 10-16-09 to Non Final Office Action mailed 04-16-09", 18 pgs	
	"Application Serial No. 12/419,219, Final Office Action mailed 10-14-10", 17 pgs	
	"Application Serial No. 12/419,219, Non Final Office Action mailed 01-15-10", 13 pgs	
	"Application Serial No. 12/419,219, Non Final Office Action mailed 02-23-11", 17 pgs	
	"Application Serial No. 12/419,219, Non Final Office Action mailed 08-04-11", 16 pgs.	
	"Application Serial No. 12/419,219, Notice of Allowance Mailed 01-10-12", 7 pgs	
	"Application Serial No. 12/419,219, Preliminary Amendment filed 04-06-09", 7 pgs	
	"Application Serial No. 12/419,219, Response filed 02-14-11 to Final Office Action mailed 10-14-10", 19 pgs.	
	"Application Serial No. 12/419,219, Response filed 05-20-11 to Non Final Office Action mailed 02-23-11", 14 pgs	
	"Application Serial No. 12/419,219, Response filed 07-15-10 to Non Final Office Action mailed 01-15-10", 22 pgs	
	"Application Serial No. 12/419,219, Response filed 10-27-11 to Non Final Office Action mailed 08-04-11", 12 pgs	
	"Application Serial No. 13/427,665, Non Final Office Action mailed 01-04-13", 23 pgs.	
	"Application Serial No. 13/427,665, Non Final Office Action mailed 08-03-12", 12 pgs.	
	"Application Serial No. 13/427,665, Notice of Allowance mailed 04-16-13", 8 pgs	
	"Application Serial No. 13/427,665, Response filed 03-21-13 to Non Final Office Action mailed 01-04-13", 20 pgs	
	"Application Serial No. 13/427,665, Response filed 10-10-12 to Non Final Office Action mailed 08-03-12", 15 pgs	
	"Application Serial No. 13/427,685, Preliminary Amendment filed 03-22-12", 3 pgs	
	"Application Serial No. 13/453,274, Advisory Action mailed 11-24-14", 3 pgs	
	"Application Serial No. 13/453,274, Final Office Action mailed 10-16-14", 4 pgs	
	"Application Serial No. 13/453,274, Notice of Allowance mailed 01-05-15", 5 pgs	
	"Application Serial No. 13/453,274, Response filed 11-06-14 to Final Office Action mailed 10-16-14", 7 pgs.	
	"Application Serial No. 13/453,274, Response filed 12-09-14 to Advisory Action mailed 11-24-14", 6 pgs	
	"Application Serial No. 13/453,274, Non Final Office Action mailed 05-30-14", 6 pgs.	
	"Application Serial No. 13/453,274, Response filed 09-02-14 to Non Final Office Action mailed 05-30-14", 13 pgs.	
	"Application Serial No. 13/966,768, Non Final Office Action mailed 12-06-13", 7 pgs.	
	"Application Serial No. 13/966,768, Notice of Allowability mailed 08-01-14", 6 pgs	
	"Application Serial No. 13/966,768, Notice of Allowance mailed 04-18-14", 7 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 6 of 9	Attorney Docket No: 3338.005US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 13/966,768, Preliminary Amendment filed 08-14-13", 3 pgs.	
	"Application Serial No. 13/966,768, Response filed 03-06-14 to Non Final Office Action mailed 12-06-13", 6 pgs.	
	"Application Serial No. 13/966,768, Supplemental Preliminary Amendment filed 08-15-13", 6 pgs.	
	"Application Serial No. 14/564,860, Preliminary Amendment filed 12-10-14", 6 pgs.	
	"Bromine and its Compounds", Jolles, Z. E., Editor, Academic Press, Inc., New York, NY, (1966), pgs. 193 and 205	
	"Canadian Application Serial No. 2,584,327, Office Action mailed 03-03-09", 4 pgs.	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 04-02-15", 5 pgs	
	"European Application Serial No. 05814011.2, Response filed 09-09-11 to European Search Report mailed 04-14-09 and Office Action mailed 11-05-09", 20 pgs.	
	"European Application Serial No. 05814011.2, Office Action mailed 01-25-08", 2 pgs.	
	"European Application Serial No. 05814011.2, Office Action mailed 11-05-09", 2 pgs.	
	"European Application Serial No. 05814011.2, Partial European Search Report mailed 04-14-09", 13 pgs.	
	"European Application Serial No. 05814011.2, Response filed 04-18-08 to Office Action mailed 01-25-08 and Third Party Observations submitted 12-04-07", 7 pgs.	
	"European Application Serial No. 05814011.2, Response filed 05-11-10 to Office Action mailed 11-05-09", 11 pgs.	
	"European Application Serial No. 05814011.2, Third Party Observations submitted 03-19-12", 7 pgs.	
	"European Application Serial No. 05814011.2, Third Party Observations submitted 12-04-07", 5 pgs.	
	"International Application Serial No. PCT/US2013/036964, International Preliminary Report on Patentability mailed 07-17-14", 11 pgs	
	"International Application Serial No. PCT/US2013/036964, Written Opinion mailed 04-15-14", 10 pgs	
	"International Application Serial No. PCT/US2013/036964, International Search Report mailed 11-29-13", 7 pgs	
	"International Application Serial No. PCT/US2013/036964, Invitation to Pay Additional Fees and Partial Search Report mailed 08-02-13", 7 pgs	
	"International Application Serial No. PCT/US2013/036964, Written Opinion mailed 11-29-13", 13 pgs	
	"International Application Serial No. PCT/US2014/019916, International Search Report mailed 10-13-14", 6 pgs.	
	"International Application Serial No. PCT/US2014/019916, Written Opinion mailed 10-13-14", 13 pgs.	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 7 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"International Application Serial No. PCT/US2014/019916, Invitation to Pay Additional Fees and Partial Search Report mailed 05-30-14", 6 pgs	
	BAKANDRITSOS, A., et al., "Aqueous and Gaseous Adsorption from Montmorillonite-Carbon Composites and from Derived Carbons", <u>Langmuir</u> , 21, (2005), 2349-2355	
	BAKANDRITSOS, A., et al., "High Surface Area Montmorillonite - Carbon Composites and Derived Carbons", <u>Chemistry of Materials</u> , Vol. 16, No. 8, (16 March 2004), 1551-1559	
	CHANG, SHIH-GER, "METHOD FOR OXIDATION OF MERCURY VAPOR", Provisional Application Serial No. 60/560,904, filed April 9, 2004, 9 pgs.	
	CRISWELL, GORDON, et al., "Progress Report on Mercury Control Retrofit at the Colstrip Power Station", Paper #91, Mega Symposium, Baltimore, MD, (August 2011), 1-23	
	DARDER, M., et al., "Caramel-clay nanocomposites", <u>Journal of Materials Chemistry</u> , 15, (2005), 3913-3918	
	DONG, J., et al., "Mercury Removal from Flue Gases by Novel Regenerable Magnetic Nanocomposite Sorbents", <u>Environ. Sci. Technol.</u> , 43, (2009), 3266-3271	
	DUNHAM, G. E., et al., "Mercury Capture by an Activated Carbon in a Fixed-Bed Bench-Scale System", <u>Environmental Progress</u> , 17(3), (1998), 203-208	
	EISAZADEH, H., "Removal of Mercury from Water Using Polypyrrole and its Composites", <u>Chinese Journal of Polymer Science</u> , 25(4), (2007), 393-397	
	FELSVANG, K., et al., "Mercury Reduction and Control Options", The U.S. EPA-DOE-EPRI Combined Power Plant Air Pollutant Control Symposium; The Mega Symposium and The A&WMA Specialty Conference and Mercury Emissions: Fate, Effects and Control; Chicago, IL, (August, 2001), 1-19	
	FERNANDEZ-SAAVEDRA, R., et al., "Polymer-Clay Nanocomposites as Precursors of Nanostructured Carbon Materials for Electrochemical Devices: Templating Effect of Clays", <u>Journal of Nanoscience and Nanotechnology</u> , 8, (2008), 1741-1750	
	GHORBANI, M., et al., "Application of polyaniline nanocomposite coated on rice husk ash for removal of Hg(II) from aqueous media", <u>Synthetic Metals</u> , (2001), 4 pgs.	
	GHORISHI, BEHROOZ, et al., "Sorption of Mercury Species by Activated Carbons and Calcium-Based Sorbents: Effect of Temperature, Mercury Concentration and Acid Gases", <u>Waste Manage. Res.</u> , 16:6, (1998), 582-593	
	GOMEZ-AVILES, A., et al., "Functionalized Carbon-Silicates from Caramel-Sepiolite Nanocomposites", <u>Angew. Chem. Int. Ed.</u> , 46, (2007), 923-925	
	GOMEZ-AVILES, A., et al., "Multifunctional materials based on graphene-like/sepiolite nanocomposites", <u>Applied Clay Science</u> , 47, (2010), 203-211	
	IKEUE, K., et al., "Noble-metal-containing nanoporous carbon synthesized within the interlayer space of montmorillonite and its catalytic property", <u>Applied Catalysis A: General</u> , 351, (2008), 68-74	
	KYOTANI, T., et al., "Formation of highly orientated graphite from polyacrylonitrile by using a two-dimensional space between montmorillonite lamellae", <u>Nature</u> , 331, (1988), 331-333	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 8 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	LANCIA, A., et al., "Adsorption of Mercuric Chloride Vapours from Incinerator Flue Gases on Calcium Hydroxide Particles", <u>Combust. Sci. & Tech.</u> , 93, (1993), 277-289	
	LAUMB, JASON D., et al., "X-ray photoelectron spectroscopy analysis of mercury sorbent surface chemistry", <u>Fuel Processing Technology</u> , 85, (2004), 577-585	
	LI, Y., et al., "Removal of elemental mercury from simulated coal-combustion flue gas using a SiO ₂ -TiO ₂ nanocomposite", <u>Fuel Processing Technology</u> , 89, (2008), 567-573	
	MOCHIDA, I., et al., "Preparation of nitrogen containing pitches from quinoline and isoquinoline by AID of AlCl ₃ ", <u>Carbon</u> , 33(8), (1995), 1069-1077	
	NGUYEN-THANH, D., et al., "High Porosity Carbonaceous Adsorbents Templated From Porous Clay Heterostructures", <u>Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.</u> , 51(1), (2006), 7-8	
	NGUYEN-THANH, D., et al., "Metal-loaded carbonaceous adsorbents templated from porous clay heterostructures", <u>Microporous and Mesoporous Materials</u> , 92, (2006), 47-55	
	OLSON, DAVID G., et al., "The Reduction of Gas Phase Air Toxics from Combustion and Incineration Sources using the MET-Mitsui-BF Activated Coke Process", <u>Fuel Processing Technology</u> , 65-66, (2000), 393-405	
	OLSON, E. S., et al., "Catalytic effects of carbon sorbents for mercury capture", <u>Journal of Hazardous Materials</u> , 74, (2000), 61-79	
	OLSON, EDWIN S., et al., "Surface Compositions of Carbon Sorbents Exposed to Simulated Low-Rank Coal Flue Gases", <u>J. Air & Water Waste Manage. Assoc.</u> , 55, (2005), 747-754	
	VOSTEEN, B, et al., "Chlor- und Bromgestutzte Hg-Sorption an Elektrofilter-Flugaschen eines kohlegefeuerten Schmelzkammerkessels und an Zementrohmehl", <u>Matin-Luther-Universitat Halle-Wittenberg</u> , (2003), 1-30	
	VOSTEEN, B. W., et al., "", <u>Flyer on Mercury Abatement given at the VDI-Wissensforum, Dusseldorf, Germany</u> , (2003), 6 pgs.	
	VOSTEEN, B. W., "Bromine-enhanced Mercury Abatement from Combustion Flue Gases - Recent Industrial Applications and Laboratory Research", <u>VGB PowerTech, Vol. 86, Issue 3/2006</u> , (2006), 70-75	
	VOSTEEN, N., "Emissionsminderung von Quecksilber durch chlor- und bromgestutzte Hg-Oxidation in Rauchgas", (September 2003), 1-23	
	WAN, Q., et al., "Removal of gaseous elemental mercury over a CeO ₂ -WO ₃ /TiO ₂ nanocomposite in simulated coal-fired flue gas", <u>Chemical Engineering Journal</u> , 170, (2011), 512-517	
	WANG, B., et al., "Performance of a diatomite-based sorbent in removing mercury from aqueous and oil matrices", <u>J. Environ. Eng. Sci.</u> , 6, (2007), 469-476	
	ZHANG, Y., et al., "High efficient removal of mercury from aqueous solution by polyaniline/humic acid nanocomposite", <u>Journal of Hazardous Materials</u> , 175, (2010), 404-409	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 9 of 9		Attorney Docket No: 3338.005US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	ZHAO, YONGXIN, et al., "Effectsof Sulfur Dioxide and Nitric Oxide on Mercury Oxidation and Reducton under Homogeneous Conditions", <u>J. Air & Waste Manage. Assoc.</u> 56, (2006), 628-635	
	ZHENG, YUANJING, et al., "Review of technologies for mercury removal from flue gas from cement production processes", <u>Progress in Energy and Combustion Science</u> , Vol. 38, No. 5, (26 April 2012), 599-629	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
L5	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358" "6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25

		"20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.				
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13

S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:18
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:22
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2016/11/16 10:58

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB;	ADJ	ON	2016/11/16

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:28
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2016/11/16 11:33

			IBM_TDB			
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54
S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/11/16 15:23
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB;	ADJ	ON	2017/05/10

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).opc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787" "3194629" "3662523" "3786619" "3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31

6/ 27/ 2017 10:27:40 AM

C:\Users\amillerharris\Documents\EAST\Workspaces\12429058.wsp

Search Notes 	Application/Control No. 14712558	Applicant(s)/Patent Under Reexamination OLSON ET AL.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC- SEARCHED		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO

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

	/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Edwin S. Olson et al.	Examiner:	Amber Orlando
Serial No.:	14/712,558	Group Art Unit:	1776
Filed:	May 14, 2015	Docket:	4820.001US7
Customer No.:	21186	Confirmation No.:	1934
Title:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

COMMUNICATION RE: UPDATE TO APPLICATION DATA SHEET

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

Applicants hereby request that the information provided on the Application Data Sheet filed in the above-referenced application on May 14, 2015, be updated with the information as provided on the enclosed marked up Application Data Sheet.

We therefore submit a marked up copy of the Application Data Sheet which shows an update to the Applicant.

It is respectfully requested that the USPTO update their records and provide confirmation of the above request.

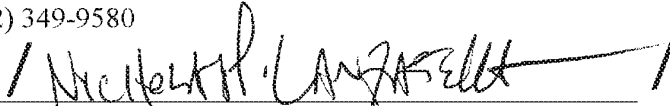
It is believed that no fee is required to fulfill this request, however, if necessary, please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

Schwegman Lundberg & Woessner, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date July 14, 2017

By


Nicholas P. Lanzatella
Reg. No. 63,803

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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:				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
Residence Information (Select One)				
☐ US Residency ☐ Non US Residency ☐ Active US Military Service				
City		State/Province	Country of Residence	
Mailing Address of Inventor:				
Address 1				
Address 2				
City		State/Province		
Postal Code		Country		

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	
Email Address	

Application Information:

Title of the Invention			
Attorney Docket Number		Small Entity Status Claimed	☐
Application Type			
Subject Matter			
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
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.		

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

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). Enter either 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	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number			

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Foreign Priority Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the POX 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	Parent Filing Date (YYYY-MM-DD)	Access Code (if applicable)

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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.

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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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.

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: ~~Energy & Environmental Research Center Foundation~~ <u>Midwest Energy Emissions Corp.</u>				
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.				
☒ 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:				
☐ Deceased		☐ Legally incapacitated		
Name of the Deceased or Legally Incapacitated Inventor :				
If the Applicant is an Organization check here: ☒				
Organization Name: ~~Energy & Environmental Research Center Foundation~~ <u>Midwest Energy Emissions Corp.</u>				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information:				
Address 1	~~15 North 23rd Street, Stop 9017~~ <u>670 D Enterprise Dr</u>			
Address 2				
City	~~Grand Forks~~ <u>Lewis Center</u>	State/Province	~~ND~~ <u>OH</u>	
Country	United States of America	Postal Code	~~58202-9017~~ <u>43035</u>	
Phone Number				
Email Address				

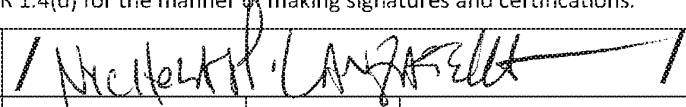
Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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.

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.				
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.				
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		Postal Code		
Phone Number		Fax Number		
Email Address				

Signature:

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 <u>INITIAL</u> filing of the application and either box A or B is <u>not</u> 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, <u>all</u> 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 <u>all</u> joint inventor-applicants. See 37 CFR 1.4(d) for the manner of making signatures and certifications.				
Signature			Date (YYYY-MM-DD)	2017-07-14
First Name	Nicholas	Last Name	Lanzatella	Registration Number
		63,803		

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 22313-14**

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

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Midwest Energy Emissions Corp.

Application No./Patent No.: 14/712,558

Filed/Issue Date: May 14, 2015

Titled: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Midwest Energy Emissions Corp. a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
 - ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
 - ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventor To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040496, Frame 0056, or for which a copy thereof is attached.

2. From: Inventor To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040495, Frame 0857, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Inventor To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at
 Reel 040496, Frame 0211, or for which a copy thereof is attached.

4. From: Energy and Environmental Research Center Foundation To: Midwest Energy Emissions Corp.

The document was recorded in the United States Patent and Trademark Office at
 Reel 042647, Frame 0351, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Nicholas P. Lanzatella
 Signature

July 14, 2017
 Date

Nicholas P. Lanzatella
 Printed or Typed Name

USPTO Reg. No. 63,803
 Title or Registration Number

Electronic Acknowledgement Receipt

EFS ID:	29786661
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Mark Victor Muller/Robin Monsees
Filer Authorized By:	Mark Victor Muller
Attorney Docket Number:	4820.001US7
Receipt Date:	14-JUL-2017
Filing Date:	14-MAY-2015
Time Stamp:	14:04:01
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		4820001US7_UADS.pdf	380948	yes	10
			a382b76ae35e2bdd40f0999c58042856a66bea3c		

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Transmittal Letter	1	1	
Miscellaneous Incoming Letter	2	2	
Application Data Sheet	3	8	
Assignee showing of ownership per 37 CFR 3.73	9	10	
Warnings:			
Information:			
Total Files Size (in bytes):		380948	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date:

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the attached:

X Communication Re: Update to Application Data Sheet (1 Pg.).

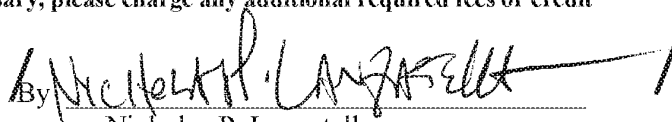
X Marked Up Application Data Sheet (6 Pgs.).

X Statement Under 37 CFR 3.73(c) (2 Pgs.).

It is believed that no additional fee is required. However, if necessary, please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743.

Schwegman Lundberg & Woessner, P.A.

Customer No.: 21186

By 

Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.111

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

In response to the Non-Final Office Action dated July 6, 2017, please enter the following:

IN THE SPECIFICATION

Please amend the specification as follows:

The following paragraph, to follow paragraph [0013], is added:

In an embodiment, coal and promoter can be present as a mixture. The promoter and the coal can be mixed before combustion of the coal at a location upstream of a boiler. The promoter can include a halide, a halogen, salts thereof, Br₂, HBr, and combinations thereof.

IN THE CLAIMS

Please amend the claims as follows:

1. (Canceled)
2. (Currently Amended) A method for separating mercury from a mercury-containing gas, the method comprising:
 - combusting a mixture of coal, the coal comprising and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof;
 - adding a particulate sorbent material comprising activated carbon into the mercury-containing gas;
 - promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material;
 - chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and
 - separating the mercury-sorbent particulate from the mercury-containing gas.
3. (Currently Amended) The method of claim 2, further comprising ~~adding~~mixing the promoter ~~[[to]]~~and the coal before combusting the coal.
4. (Currently Amended) The method of claim 3, wherein the promoter ~~added to~~ mixed with the coal is in ~~an organic solvent~~ a liquid.
5. (Currently Amended) The method of claim 4, wherein the ~~organic solvent liquid~~ is a hydrocarbon, a chlorinated hydrocarbon, supercritical carbon dioxide, water, salt solution, or a combination thereof.

-
6. (Previously Presented) The method of claim 2, wherein the particulate promoted sorbent material comprises active sites, wherein the active sites comprise halide anions bound to the activated carbon.
7. (Previously Presented) The method of claim 2, wherein the particulate promoted sorbent material comprises active sites, wherein the active sites comprise carbocations bound to halide anions.
8. (Previously Presented) The method of claim 2, wherein chemically reacting the sorbent material with the promoter in the mercury-containing gas comprises chemically reacting carbene species edge sites in the activated carbon with the promoter.
9. (Previously Presented) The method of claim 2, wherein carbocations in the activated carbon of the mercury-sorbent particulate accept electrons from mercury atoms of the mercury-sorbent particulate.
10. (Previously Presented) The method of claim 2, wherein the promoter is substantially in vapor form in the mercury-containing gas.
11. (Currently Amended) The method of claim 2, wherein the promoter is chosen from Cl_2 , ~~Br_2~~ , HCl , ~~HBr~~ , sodium chloride, calcium chloride, and a combination thereof.
12. (Currently Amended) The method of claim 2, wherein the promoter is chosen from Br_2 , HBr , sodium bromide, calcium bromide, and a combination thereof.
13. (Previously Presented) The method of claim 2, wherein the promoter is chosen from PBr_3 , SCl_2 , and a combination thereof.
14. (Currently Amended) The method of claim 2, wherein the promoter is chosen from I_2 , HI , sodium iodide, calcium iodide, potassium iodide, and combinations thereof.

15. (Previously Presented) The method of claim 2, wherein the activated carbon is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

16. (Previously Presented) The method of claim 2, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

17. (Previously Presented) The method of claim 2, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

18. (Previously Presented) The method of claim 2, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

19. (Currently Amended) The method of claim 18, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

20. (Previously Presented) The method of claim 18, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

21. (Currently Amended) A method for separating mercury from a mercury-containing gas, the method comprising:

combusting coal~~adding mixed with a promoter to coal~~, wherein the promoter is chosen from ~~Br₂, HBr,~~ halides, halogens, salts thereof, and combinations thereof~~[[;]], combusting the coal~~ to form the mercury-containing gas;

injecting a particulate sorbent material comprising activated carbon into the mercury-containing gas;

promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material;

chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and

separating the mercury-sorbent particulate from the mercury-containing gas,

wherein the coal and promoter are mixed at a location upstream of a combustion furnace where combustion occurs.

REMARKS

This responds to the Non-Final Office Action dated July 6, 2017.

Claims 2-5, 11, 12, 14, 19, and 21 are presently amended. No claims are presently canceled. No new claims are presently added. As a result, claims 2-21 are now pending in this application.

Claim 2 is presently amended to recite "...combusting a mixture of coal, ~~the coal comprising~~ and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof..." Claim 21 is similarly amended.

The specification has been amended to include a new paragraph stating:

In an embodiment, coal and promoter can be present as a mixture. The promoter and the coal can be mixed before combustion of the coal at a location upstream of a boiler. The promoter can include a halide, a halogen, salts thereof, Br₂, HBr, and combinations thereof.

Support for the amendment to claim 2 and the new paragraph in the specification can be found in FIG. 2 and pages 2, 3, 9 of United States Provisional Patent Application No. 60/605,640, to which the instant application claims priority.

No new matter is added via the amendments herein.

The Rejection of Claims Under §112

I. The Office Action rejects claims 2-21 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.

Claim 2 is presently amended to recite "...combusting a mixture of coal, ~~the coal comprising~~ and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof..." Claim 21 is similarly amended.

This application claims priority to United States Provisional Patent Application No. 60/605,640 ("the '640 application"). Annotated FIG. 2 of the '640 application is reproduced below.

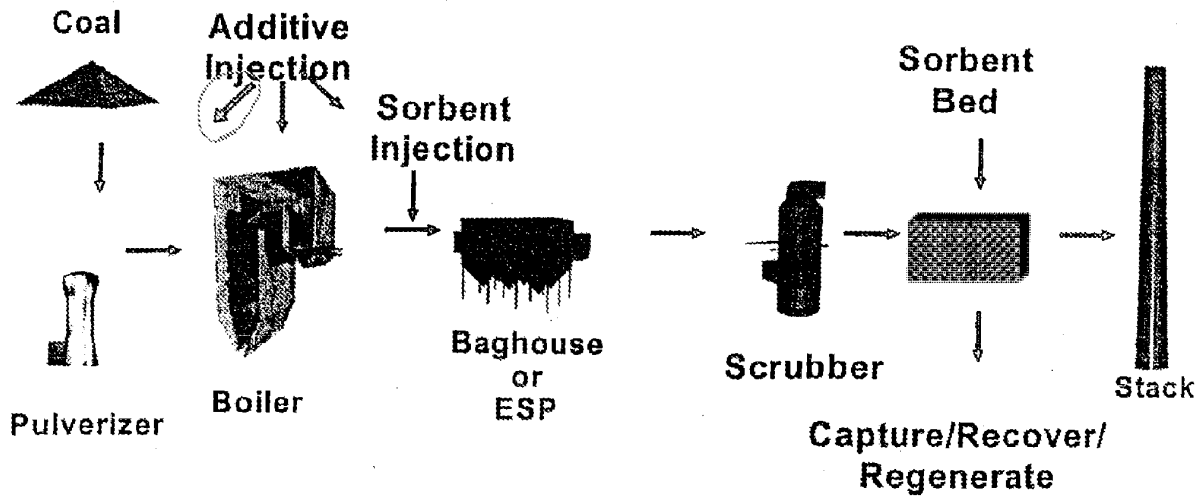


FIG. 2

Annotated FIG. 2

FIG. 2 shows coal that is pulverized and sent to a boiler for combustion. FIG. 2 also shows “additive injection”. Three arrows are provided to show points where the additive can be injected. One arrow shows injection downstream of the boiler; another arrow shows injection at the boiler; and another arrow (circled in red) shows injection upstream of the boiler. The injection of the additive upstream of the boiler results in mixing the additive with the coal.

The “additive” of the ‘640 application provides support for the “promoter” feature as recited in the instant claims. As recited in claim 2, “...the promoter is chosen from halides, halogens, and combinations thereof...” As recited in claim 21, “...the promoter is chosen from Br₂, HBr, and combinations thereof...” The scope of the “additive” of the ‘640 application is commensurate with that of the “promoter” in the instant application.

Page 3 of the provisional patent application denotes that the “additives” can include those listed in Example 1E. Those additives include bromines or hydrohalides. Thus the “additives” of the provisional would be understood by one of ordinary skill to refer to the promoter of the instant application.

The Office Action further states that claims 3-5 also lack support. Applicant respectfully disagrees. Claim 3 is supported by the cited sections of the provisional patent application. Claims 4

and 5 are explicitly supported by paragraphs [0017] and [0053] of Applicant's Published Patent Application as well as page 2 of the '640 application.

The Office Action further states that "...it is not known how the coal comprises a promoter, or how the promoter is added to the coal...[or] how coal can be combusted." Applicant respectfully submits that the newly amended features of claims 2 and 21 provide sufficient guidance to one of ordinary skill in the art to enable a mixture of coal and a promoter. Specifically, one of ordinary skill in the art referring to FIG. 2 of the '640 application would understand that the coal and promoter can be mixed at any point during or before the process disclosed therein. Additionally, FIG. 2 plainly shows a boiler where the coal and promoter are combusted.

The Office Action further states that "...[t]he state of the prior art does not disclose coal comprising a promoter, or combusting the coal with the promoter, and then from that reaction product react a promoter with a particulate sorbent material to form a promoted sorbent material." This feature of amended claims 2 and 21, however, is disclosed in the '640 application. Again, the amended claims recite a mixture of coal and the promoter. FIG. 2 and the supporting text of the '640 application plainly show the claimed processes and would be understood by one of ordinary skill in the art.

The Office Action further states that there is "...no predictability in the art, as it is unknown how the coal is combined with the promoter, how the promoter reacts when subjected to the combustion product of coal, nor how the reaction product of the combustion process will react with a particulate sorbent material to form a promoted sorbent material." However, the cited sections of the '640 application do in fact shown the exact points at which the promoter and coal can be combined and further describes the reaction. *See, e.g.*, pages 6-7 of the '640 application.

The Office Action further states that "[t]here is no direction provided by the inventor as the specification lacks antecedent basis for the claimed subject matter." The Office Action further states that because the specification allegedly lacks antecedent basis for the claimed subject matter, the "quantity of experimentation needed to use the invention...is high...." For the reasons stated herein at **III.**, these factors are overcome by the amendment to the specification.

The Office Action further states, that there are no working examples of the disclosure. Applicant respectfully disagrees and refers to page 12 of the '640 application as read in conjunction with FIG. 2, which describes at least one example of the method.

With the amendments to claims 2-4 and 21 in view of the support cited in the provisional patent application the rejection under § 112(a) is overcome. Because the rejection under § 112(a) is overcome, the rejection of claims 5-20, which depend from claim 2 are overcome therewith. Applicant, therefore, respectfully requests reconsideration and withdrawal of the rejection.

II. The Office Action states that United States Provisional Patent Application No. 60/605,640 fails to provide adequate support or enablement pursuant to 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph to support a claim for priority.

For the reasons stated herein at I., United States Provisional Patent Application No. 60/605,640 provides adequate support for “...combusting a mixture of coal, the coal comprising and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof...” Given the similarity of the amendment to claim 21, there is adequate support for claim 21.

Applicant therefore respectfully requests that the claim for priority be acknowledged.

Specification Objections

III. The Office Action objects to the specification for not providing proper antecedent basis for the claimed subject matter.

In support of this objection, the Office Action states that the feature “combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof” (claim 2) and subsequently reacting the promoter with particulate sorbent material and subsequent claimed subject matter of claims 3-5, which pertain the coal comprising at promoter are not disclosed within the specification. The Office Action goes on to allege that in claim 21, the feature “adding a promoter to coal, wherein the promoter is chosen from Br₂, HBr, and combinations thereof: combusting the coal to form the mercury-containing gas” and subsequently reacting the promoter with particulate sorbent material were not disclosed within the specification.

Claim 2 is presently amended to recite “...combusting a mixture of coal, the coal comprising and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof...” Claim 21 is similarly amended.

The specification has been amended to recite mixed coal and promoter. Specifically, the specification has been amended to include a new paragraph stating:

“In an embodiment, coal and promoter can be present as a mixture. The promoter and the coal can be mixed before combustion of the coal at a location upstream of a boiler. The promoter can include a halide, a halogen, salts thereof, Br₂, HBr, and combinations thereof.”

In view of these amendments to the specification which are supported by the United States Provisional Patent Application. Applicant also respectfully submits that claim 3 is supported by the cited sections of the provisional patent application. Claims 4 and 5 are explicitly supported by paragraphs [0017] and [0053] of Applicant's Published Patent Application. Applicant respectfully requests reconsideration and withdrawal of the objection to the specification.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (651) 305-2704 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date October 6, 2017

By /Ryan J. Connell/

Ryan J. Connell
Reg. No. 74,611

Electronic Acknowledgement Receipt

EFS ID:	30592675
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Joseph P. Mehrle/April Smith
Filer Authorized By:	Joseph P. Mehrle
Attorney Docket Number:	4820.001US7
Receipt Date:	06-OCT-2017
Filing Date:	14-MAY-2015
Time Stamp:	17:22:46
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		4820001US7Amendment.pdf	236983	yes	13
			687d91d65af67a6df69d58595c04e662a7d93aff		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Transmittal Letter	1	1
	Amendment/Req. Reconsideration-After Non-Final Reject	2	2
	Specification	3	3
	Claims	4	7
	Applicant Arguments/Remarks Made in an Amendment	8	13
Warnings:			
Information:			
Total Files Size (in bytes):		236983	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: October 6, 2017

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

X Amendment and Response under 37 C.F.R. § 1.111 (12 pgs.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: /Ryan J. Connell/

Ryan J. Connell

Reg. No. 74,611

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 5		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20020033097A1	3/21/2002	El-shoubary, Youssef, et al.
	US-20030206843A1	11/6/2003	Sidney Jr, Nelson G
	US-20030206846A1	11/6/2003	Jangbarwala, Juzer
	US-20040109800	6/10/2004	Pahlman, John E, et al.
	US-20050000197A1	1/6/2005	Krantz, Jeffrey
	US-20050074380A1	4/7/2005	Boren, Richard M, et al.
	US-20050147549A1	7/7/2005	Lissianski, Vitali Victor, et al.
	US-20050227146A1	10/13/2005	Ghantous, Dania, et al.
	US-20060057044A1	3/16/2006	Chang, Shih-ger, et al.
	US-20060112823A1	6/1/2006	Avina, David Christopher
	US-20060204418A1	9/14/2006	Chao, Chien-chung, et al.
	US-20070168213A1	7/19/2007	Comrie, Douglas C
	US-20070234902A1	10/11/2007	Fair, David L, et al.
	US-20070295347A1	12/27/2007	Paine III, John B, et al.
	US-20080134888A1	6/12/2008	Chao, Chien-chung, et al.
	US-20080207443A1	8/28/2008	Gadkaree, Kishor Purushottam, et al.
	US-20090081092A1	3/26/2009	Yang, Xiaolin David, et al.
	US-20170100692A1	4/13/2017	Olson, Edwin S, et al.
	US-20170128908A1	5/11/2017	Olson, Edwin S., et al.
	US-20170173557A1	6/22/2017	Olson, Edwin S, et al.
	US-20170239644A1	8/24/2017	Olson, Edwin S, et al.
	US-4,530,765	7/23/1985	Sabherwal, Inderjit H
	US-5,245,120	9/14/1993	Srinivasachar, Srivats, et al.
	US-5,288,306	2/22/1994	Aibe, Toshio, et al.
	US-5,346,674	9/13/1994	Weinwurm, Peter, et al.
	US-5,419,834	5/30/1995	Straten, Gunter
	US-5,435,980	7/25/1995	Felsvang, Karsten S, et al.
	US-7,938,571	5/10/2011	Irvine, James H
	US-7,942,566	5/17/2011	Irvine, James H
	US-9,468,886	10/18/2016	Olson, Edwin S, et al.
	US-9,669,355	6/6/2017	Olson, Edwin S, et al.
	US-9,757,689	9/12/2017	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 5		Attorney Docket No: 4820.001US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2584327A1	4/13/2006	Pavlish, John H, et al.	
	CN-101048218A	10/3/2007	Olson, Edwin S, et al.	
	EP-1386655A1	2/4/2004	Vosteen, Vosteen Bernhard, et al.	
	GB-2122916A	1/25/1984	Nishino, Hiroshi, et al.	
	JP-50145324A	3/3/1980		
	WO-2006039007A2	4/13/2006	Olson, Edwin S, et al.	
	WO-2006039007A3	4/13/2006	Olson, Edwin S, et al.	
	WO-2006099611A1	9/21/2006	Comrie, Douglas C, et al.	
	WO-2010123609A1	10/28/2010	Olson, Edwin S, et al.	
OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 12/429,058, Advisory Action mailed 05-29-12", 3 pgs			
	"Application Serial No. 12/429,058, Ex Parte Quayle Action mailed 02-14-13", 7 pgs			
	"Application Serial No. 12/429,058, Examiner Interview Summary mailed 12-28-12", 4 pgs			
	"Application Serial No. 12/429,058, Final Office Action mailed 10-31-12", 21 pgs			
	"Application Serial No. 12/429,058, Final Office Action mailed 12-20-11", 21 pgs			
	"Application Serial No. 12/429,058, Non Final Office Action mailed 06-11-12", 18 pgs			
	"Application Serial No. 12/429,058, Non Final Office Action mailed 07-19-11", 20 pgs			
	"Application Serial No. 12/429,058, Notice of Allowance mailed 01-16-14", 5 pgs			
	"Application Serial No. 12/429,058, Notice of Allowance mailed 09-11-13", 11 pgs			
	"Application Serial No. 12/429,058, Response filed 01-31-13 to Final Office Action mailed 10-31-12", 19 pgs			
	"Application Serial No. 12/429,058, Response filed 03-07-13 to Ex Parte Quayle Action mailed 02-14-13", 7 pgs			
	"Application Serial No. 12/429,058, Response filed 05-11-12 to Final Office Action mailed 12-20-11", 11 pgs			
	"Application Serial No. 12/429,058, Response filed 09-11-12 to Non Final Office Action mailed 06-11-12", 16 pgs			
	"Application Serial No. 12/429,058, Response filed 10-18-11 to Non Final Office Action mailed 07-19-11", 17 pgs			
	"Application Serial No. 14/102,896, Advisory Action mailed 12-16-15", 3 pgs			
	"Application Serial No. 14/102,896, Final Office Action mailed 08-26-15", 12 pgs			
	"Application Serial No. 14/102,896, Non Final Office Action mailed 03-23-15", 13 pgs			
	"Application Serial No. 14/102,896, Notice of Allowance mailed 06-10-16", 7 pgs			
	"Application Serial No. 14/102,896, Response filed 01-22-16 to Advisory Action mailed 12-16-15", 11 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 3 of 5	Attorney Docket No: 4820.001US7	

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	"Application Serial No. 14/102,896, Response filed 06-22-15 to Non Final Office Action mailed 03-23-15", 10 pgs			
	"Application Serial No. 14/102,896, Response filed 11-24-15 to Final Office Action mailed 08-26-15", 5 pgs			
	"Application Serial No. 14/195,360, Corrected Notice of Allowance mailed 02-27-17", 2 pgs			
	"Application Serial No. 14/195,360, Corrected Notice of Allowance mailed 03-29-17", 2 pgs			
	"Application Serial No. 14/195,360, Final Office Action mailed 11-22-16", 7 pgs			
	"Application Serial No. 14/195,360, Notice of Allowance mailed 02-07-17", 5 pgs			
	"Application Serial No. 14/195,360, Response filed 01-18-17 to Final Office Action mailed 11-22-16", 7 pgs.			
	"Application Serial No. 14/318,270, Advisory Action mailed 02-17-17", 4 pgs			
	"Application Serial No. 14/318,270, Corrected Notice of Allowance mailed 05-22-17", 2 pgs			
	"Application Serial No. 14/318,270, Final Office Action mailed 11-25-16", 25 pgs			
	"Application Serial No. 14/318,270, Notice of Allowance mailed 05-15-17", 8 pgs			
	"Application Serial No. 14/318,270, Response filed 01-25-17 to Final Office Action mailed 11-25-16", 14 pgs			
	"Application Serial No. 14/318,270, Response filed 02-27-17 to Final Office Action mailed 11-25-16", 15 pgs			
	"Application Serial No. 15/295,594, Preliminary Amendment filed 01-26-17", 8 pgs			
	"Application Serial No. 15/295,594, Preliminary Amendment filed 06-13-17", 7 pgs			
	"Application Serial No. 15/382,114, Preliminary Amendment filed 04-04-17", 3 pgs			
	"Application Serial No. 15/449,112, Non Final Office Action mailed 09-27-17", 17 pgs			
	"Canadian Application Serial No. 2,584,327, Office Action mailed 12-07-09", 2 pgs			
	"Canadian Application Serial No. 2,584,327, Response filed 03-19-10 to Office Action mailed 12-07-09", 8 pgs			
	"Canadian Application Serial No. 2,584,327, Response filed 09-02-09 to Office Action mailed 03-03-09", 21 pgs			
	"Canadian Application Serial No. 2,757,309, Office Action mailed 12-07-15", 3 pgs			
	"Canadian Application Serial No. 2,757,309, Response filed 06-06-16 to Office Action mailed 12-07-15", 13 pgs			
	"Canadian Application Serial No. 2,757,309, Voluntary Amendment filed 01-30-15", 27 pgs			
	"Chinese Application Serial No. 200580037037.0, Chinese Office Action, dated June 25, 2013 (and English translation)", no english translation, 46 pgs			
	"DARCO® FGD- Powdered Activated Carbon", Norit Americas Inc. Datasheet No. 1100, (May 2009), 1 pg			
	"European Application Serial No. 05814011.2, Communication Pursuant to Article 94(3) EPC mailed 11-05-09", 4 pgs			
	"European Application Serial No. 05814011.2, Decision to grant mailed 06-08-12", 2 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 4 of 5		Attorney Docket No: 4820.001US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	"European Application Serial No. 05814011.2, Extended European Search Report mailed 04-14-09", 13 pgs			
	"European Application Serial No. 05814011.2, Office Action mailed 01-31-12", 4 pgs			
	"European Application Serial No. 05814011.2, Office Action mailed 04-27-12", 6 pgs			
	"European Application Serial No. 05814011.2, Response filed 02-28-12 to Office Action mailed 01-31-12", 30 pgs			
	"European Application Serial No. 05814011.2, Response filed 05-11-10 to Communication Pursuant to Article 94(3) EPC mailed 11-05-09", 11 pgs			
	"European Application Serial No. 05814011.2, Response filed 09-09-11 to Extended European Search Report mailed 04-14-09", 20 pgs			
	"European Application Serial No. 10767465.7, Decision to grant mailed 04-17-14", 2 pgs			
	"European Application Serial No. 10767465.7, Extended European Search Report mailed 12-06-12", 5 pgs			
	"European Application Serial No. 10767465.7, Intention to Grant mailed 03-17-14", 44 pgs			
	"European Application Serial No. 10767465.7, Intention to Grant mailed 09-30-13", 44 pgs			
	"European Application Serial No. 10767465.7, Response filed 02-03-14 to Intention to Grant mailed 09-30-13", 11 pgs			
	"European Application Serial No. 10767465.7, Response filed 06-20-13 to Extended European Search Report mailed 12-06-12", 18 pgs			
	"European Application Serial No. 11189249.3, Communication Pursuant to Article 94(3) EPC mailed 11-26-12", 4 pgs			
	"European Application Serial No. 11189249.3, Decision to Refuse mailed 12-19-13", 18 pgs			
	"European Application Serial No. 11189249.3, Extended European Search Report mailed 02-01-12", 7 pgs			
	"European Application Serial No. 11189249.3, Office Action mailed 11-04-13", 4 pgs			
	"European Application Serial No. 11189249.3, Response filed 02-04-13 to Communication Pursuant to Article 94(3) EPC mailed 11-26-12", 9 pgs			
	"European Application Serial No. 11189249.3, Response filed 08-28-12 to Extended European Search Report mailed 02-01-12", 9 pgs			
	"European Application Serial No. 11189249.3, Summons to Attend Oral Proceedings mailed 04-15-13", 7 pgs			
	"European Application Serial No. 11189252.7, Communication Pursuant to Article 94(3) EPC mailed 01-09-13", 4 pgs			
	"European Application Serial No. 11189252.7, Decision to grant mailed 05-02-14", 2 pgs			
	"European Application Serial No. 11189252.7, Extended European Search Report mailed 01-23-12", 6 pgs			
	"European Application Serial No. 11189252.7, Extended European Search Report mailed 05-09-12", 12 pgs			
	"European Application Serial No. 11189252.7, Office Action mailed 10-30-13", 4 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 5 of 5		Attorney Docket No: 4820.001US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	"European Application Serial No. 11189252.7, Office Action mailed 12-11-13", 6 pgs			
	"European Application Serial No. 11189252.7, Response filed 02-11-13 to Communication Pursuant to Article 94(3) EPC mailed 01-09-13", 5 pgs			
	"European Application Serial No. 11189252.7, Response filed 10-10-13 to Office Action mailed 04-15-13", 18 pgs			
	"European Application Serial No. 11189252.7, Response filed 11-22-12 to Extended European Search Report mailed 05-09-12", 13 pgs			
	"European Application Serial No. 11189252.7, Summons to Attend Oral Proceedings mailed 04-15-13", 6 pgs			
	"International Application Serial No. PCT/US2005/030018, International Preliminary Report on Patentability mailed 12-27-06", 3 pgs			
	"International Application Serial No. PCT/US2005/030018, International Search Report mailed 07-25-06", 2 pgs			
	"International Application Serial No. PCT/US2005/030018, Written Opinion mailed 07-25-06", 3 pgs			
	"International Application Serial No. PCT/US2010/022807, International Preliminary Report on Patentability mailed 11-03-11", 6 pgs			
	"International Application Serial No. PCT/US2010/022807, International Search Report mailed 09-13-10", 3 pgs			
	"International Application Serial No. PCT/US2010/022807, Written Opinion mailed 09-13-10", 4 pgs			
	"Powdered Activated Carbon", Cabot Corp, [Online] retrieved from the internet: < http://www.cabotcorp.com/solutions/products-plus/activated-carbon/powdered >, (01/03/15), 3 pgs			
	HA, et al., "Effect of unburnt carbon on the corrosion performance of fly ash cement mortar", Construction and Building Materials, (09/01/2005), 7 pgs			
	M, HOCQUEL, "Quecksilber und seine Verbindungen bei der Abfallverbrennung", with English Abstract pg 3, (12/31/2000), 112 pgs			
	MAROTO-VALER, M. MERCEDES, et al., "DEVELOPMENT OF ACTIVATED CARBONS FROM COAL AND BIOMASS COMBUSTION AND GASIFICATION CHARs", (2004), 2 pgs			
	PADAK, BIHTER, "Understanding mercury binding on activated carbon", Carbon 47.1 2, (2009), 2855-2864			
	PRZEPORSKI, J, et al., "High temperature ammonia treatment of activated carbon for enhancement of CO2 adsorption", Applied Surface Science 225.1, (2004), 235-242			
	SMOKEY, et al., "Alternative to Activated Carbon for Mercury Control", Power Engineering, (Oct 2012), 10 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		John Nelson Greaves/Annelie Lenasen		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	30593133
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	John Nelson Greaves/Annelie Lenasen
Filer Authorized By:	John Nelson Greaves
Attorney Docket Number:	4820.001US7
Receipt Date:	06-OCT-2017
Filing Date:	14-MAY-2015
Time Stamp:	17:52:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	101017INTEFSW00004592190743
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		15712558_sids_10-06-17.pdf	239899	yes	10
			d6ea222a0d252776a5714307917c16f607f8cc4b		
	Multipart Description/PDF files in .zip description				
	Document Description		Start		End
	Miscellaneous Incoming Letter		1		1
	Miscellaneous Incoming Letter		2		3
	Transmittal Letter		4		5
	Information Disclosure Statement (IDS) Form (SB08)		6		10
Warnings:					
Information:					
2	Foreign Reference	0001_ca2584327a1.pdf	6127033	no	45
			91b918f98be8d69046702a8d47d89771a8298a6c		
Warnings:					
Information:					
3	Foreign Reference	0002_cn101048218a.pdf	6920931	no	48
			35e4e708f78e6975b467f7c08dc1b6244136e7aa		
Warnings:					
Information:					
4	Foreign Reference	0003_ep1386655a1.pdf	2861979	no	21
			9a5d4c835d390aa4e23b9d14ecb0dc527233f74a		
Warnings:					
Information:					

5	Foreign Reference	0004_gb2122916a.pdf	2774452	no	20
			de3091689969eb5ad96705aeda96d2db88bf92b8		
Warnings:					
Information:					
6	Foreign Reference	0005_jps50145324a.pdf	1414246	no	9
			31429cd37fe9bd6505773e68215b8eed6c709752		
Warnings:					
Information:					
7	Foreign Reference	0006_wo2006039007a2.pdf	6253198	no	41
			44b54535b9570507e4211211599d21a0eb692441		
Warnings:					
Information:					
8	Foreign Reference	0007_wo2006039007a9.pdf	5792696	no	42
			037264a5884ae6514c679aede958de808ef82d11		
Warnings:					
Information:					
9	Foreign Reference	0008_wo2006099611a1.pdf	9402733	no	64
			988863052f46d834249cb46ffd91cf9a7bd6f665		
Warnings:					
Information:					
10	Foreign Reference	0009_wo2010123609a1.pdf	5656010	no	41
			4d3e84bcd6feb18211d37b4318e9c5986724a477		
Warnings:					
Information:					
11	Non Patent Literature	0010_5_4820007us1_adar_052912.pdf	408771	no	3
			4e2cf578064559b02bd82007509d2ff7e0787e6e		
Warnings:					
Information:					

12	Non Patent Literature	0011_11_4820007us1_xpqa_021413.pdf	604728	no	7
			ee6361490001a6193c1ebd12304a736aa5e5d465		
Warnings:					
Information:					
13	Non Patent Literature	0012_9_4820007us1_exir_122812.pdf	443810	no	4
			51ac52054f946839ae53b833b3bca0f824ae1507		
Warnings:					
Information:					
14	Non Patent Literature	0013_8_4820007us1_foar_103112.pdf	1986753	no	21
			fb4a077b54a845c190d5b0d3fbad6d5903df229f		
Warnings:					
Information:					
15	Non Patent Literature	0014_3_4820007us1_foar_122011.pdf	1928973	no	21
			60e35792b674929ae705bbc14865fb40052e60e8		
Warnings:					
Information:					
16	Non Patent Literature	0016_1_4820007us1_oarn_071911.pdf	1915194	no	20
			60507c70ec057dd438b8b685e8beb7689f2b1f69		
Warnings:					
Information:					
17	Non Patent Literature	0017_14_4820007us1_noar_011614.pdf	473573	no	5
			3c5e4cb17d13784d5294e101453771ea812f4f0b		
Warnings:					
Information:					
18	Non Patent Literature	0018_13_4820007us1_noar_091113.pdf	1189977	no	11
			1f3c336c1b05620647f682a6d0e702d5368054f4		
Warnings:					
Information:					

19	Non Patent Literature	0019_10_4820007us1_aarf_013113.pdf	2446062	no	19
			e24d012cca19075f9ae3def9090de255401107c0		
Warnings:					
Information:					
20	Non Patent Literature	0020_12_4820007us1_xpqre_030713.pdf	738338	no	7
			df3aa277b684b0bf939b4ace294f949003a084d2		
Warnings:					
Information:					
21	Non Patent Literature	0021_4_4820007us1_aarf_051112.pdf	1285863	no	11
			047f554b7dd9c3ec087443f849f4b1ab1272325b		
Warnings:					
Information:					
22	Non Patent Literature	0022_7_4820007us1_aarn_091112.pdf	2061966	no	16
			50b14e6d0dc6b0f6533e9989c245a9d28cd5e67f		
Warnings:					
Information:					
23	Non Patent Literature	0023_2_4820007us1_aarn_101811.pdf	2134590	no	17
			e0dbc00579e6663e3f0b798053c0212ca6a898f3		
Warnings:					
Information:					
24	Non Patent Literature	0024_4820007us2_adar_121615.pdf	349062	no	3
			9a6cdf1830e4c8d57513ec3ba002761cb4e6f5db		
Warnings:					
Information:					
25	Non Patent Literature	0025_4820007us2_foar_082615.pdf	1154163	no	12
			569b1e46f2b582a9fa18744ff425e2e9fe9e5ab0		
Warnings:					
Information:					

26	Non Patent Literature	0026_4820007us2_oarn_032315.pdf	1210853	no	13
			fe6ea0167ab9f8b5302a3b16c8b521e77834cedc		
Warnings:					
Information:					
27	Non Patent Literature	0027_4820007us2_noar_061016.pdf	952730	no	7
			1a5ca4a9e113280aa2e8e5985403132571bdeab4		
Warnings:					
Information:					
28	Non Patent Literature	0028_4820007us2_adaf_012216.pdf	1435468	no	11
			1bfbe7ab9b64d605626b4c7af485a964bead51c7		
Warnings:					
Information:					
29	Non Patent Literature	0029_4820007us2_aarn_062215.pdf	1176079	no	10
			9bbcd4c24b6ad2f2e77d7fe5fcc93496124b50ba		
Warnings:					
Information:					
30	Non Patent Literature	0030_4820007us2_aarf_112415.pdf	671173	no	5
			d9ce961268fa39b6c40edfa2c823dec58da0c312		
Warnings:					
Information:					
31	Non Patent Literature	0031_3338021us1_cnoa_022717.pdf	380433	no	2
			9d4f4c3a2b5b619d04e9eeb8f1b89804f525f2ef		
Warnings:					
Information:					
32	Non Patent Literature	0032_3338021us1_cnoa_032917.pdf	395151	no	2
			8493f3d19497701236ced8d9fb55ee39d0b8520e		
Warnings:					
Information:					

33	Non Patent Literature	0033_3338021us1_foar_112216.pdf	603834	no	7
			000a3582b8882756f0d495bb10e684f656aa8f31		
Warnings:					
Information:					
34	Non Patent Literature	0034_3338021us1_noar_020717.pdf	811258	no	5
			3967d2fb784ea67be45303d170ddf1d77180d7c8		
Warnings:					
Information:					
35	Non Patent Literature	0035_3338021us1_aarf_011817.pdf	69514	no	7
			889a5a5c6aa4b75fcc9b4afc58c61af3f9d24120		
Warnings:					
Information:					
36	Non Patent Literature	0036_3338005us6_adar_021717.pdf	701360	no	4
			f41b5c1936da46176ae8265cc3af2d2e51d66894		
Warnings:					
Information:					
37	Non Patent Literature	0037_3338005us6_cnoa_052217.pdf	396551	no	2
			85e1fb2b7fa3b22533519195b2bea3d00418327		
Warnings:					
Information:					
38	Non Patent Literature	0039_3338005us6_noar_051517.pdf	1316282	no	8
			7724aea0b56896303a6c57a2b54b3f56b4fb8097		
Warnings:					
Information:					
39	Non Patent Literature	0040_3338005us6_aarf_012517.pdf	110197	no	14
			a604ea473dd2143e7c8dbfd3925dc71c3ecb2b6f		
Warnings:					
Information:					

40	Non Patent Literature	0041_3338005us6_adaf_022717.pdf	122051	no	15
			190ec2caa8f2eacd5ffa8e79c7a05c901a5a9702		
Warnings:					
Information:					
41	Non Patent Literature	0042_4820007us3_pamd_012617.pdf	734866	no	8
			5a069455e57b83699b97a249bcceca676831dc3		
Warnings:					
Information:					
42	Non Patent Literature	0043_4820007us3_pamd_061317.pdf	61693	no	7
			913929acc6a10c2c6cbf91e3b8f597042b1e1b8ff		
Warnings:					
Information:					
43	Non Patent Literature	0044_3338031us1_pamd_040417.pdf	48479	no	3
			9c8659221899924750062d4101f7e3b7bb41834		
Warnings:					
Information:					
44	Non Patent Literature	0045_4820005us1_oarn_092717.pdf	1931219	no	17
			0ac7d728856246fd3e1f0680f945ef45bfd8483		
Warnings:					
Information:					
45	Non Patent Literature	0046_4820001ca1_oarmisc_120709.pdf	122461	no	2
			7b66bc3f35e296ff28873f1cf615b025d6be2eed		
Warnings:					
Information:					
46	Non Patent Literature	0047_4820001ca1_aarmisc_031910.pdf	798196	no	8
			54061d1e4f8189f0f8148100c3a7eb0fa558d6da		
Warnings:					
Information:					

47	Non Patent Literature	0048_4820001ca1_aarmisc_090209.pdf	2011559	no	21
			1d6782abe954364271f7d08843ffe03148b7ef49		
Warnings:					
Information:					
48	Non Patent Literature	0049_4820007ca1_oarmisc_120715.pdf	298904	no	3
			2d4e3b154d55f03ccfa5891cd98d242d3daa9071		
Warnings:					
Information:					
49	Non Patent Literature	0050_4820007ca1_aarmisc_060616.pdf	1386645	no	13
			91f76b206c7dbcedd6dd9aad6db82dce7fc3e3af		
Warnings:					
Information:					
50	Non Patent Literature	0051_4820007ca1_vamd_013015.pdf	3117574	no	27
			3ed9dd2f08888b906dfce9ccc2d95e3fe953d5d2		
Warnings:					
Information:					
51	Non Patent Literature	0052_200580037037.pdf	6344744	no	46
			ec534dfae612007da434ee181edcaf10a4470d38		
Warnings:					
Information:					
52	Non Patent Literature	0053_norit_darco_fgd_product_sheet.pdf	6905	no	2
			0770f473035c9ffe2f9a4b2d8170d2421d18bdf3		
Warnings:					
Information:					
53	Non Patent Literature	0054_4820001ep1_e2001_110509.pdf	365282	no	4
			d357bf5d3e0c3a16b3a2ff29a8372c800f6fe15a		
Warnings:					
Information:					

54	Non Patent Literature	0056_4820001ep1_eesr_041409.pdf	1295123	no	13
			7553ff3b7c9bcd1a8fa698a81a733aff3871462f		
Warnings:					
Information:					
55	Non Patent Literature	0057_4820001ep1_e2001_013112.pdf	340082	no	4
			3d87cf9add5011d57b02e1c4436ead4d1caab3da		
Warnings:					
Information:					
56	Non Patent Literature	0058_4820001ep1_oarmisc_042712.pdf	599497	no	6
			e7fea417d39006dc7adaec948625b31d3f17babc		
Warnings:					
Information:					
57	Non Patent Literature	0059_4820001ep1_e2001ar_022812.pdf	4590160	no	30
			e434c49dc2e2a988eeb893d0e98f97105551f812		
Warnings:					
Information:					
58	Fee Worksheet (SB06)	fee-info.pdf	30742	no	2
			1db601f4adc2905e4c8accb1951fc9d41fd489a3		
Warnings:					
Information:					
Total Files Size (in bytes):			101002065		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

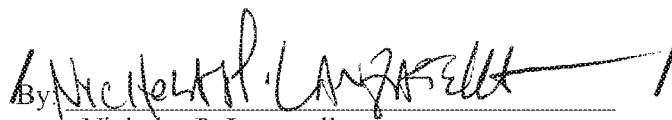
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Communication Concerning Prior and Copending Applications (1 pg.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (5 pgs.) Copies of Cited References (97).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$180.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By 
Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COENDING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
15/589,359	May 8, 2017	4820.003US2	ACTIVATED CARBON SORBENT INCLUDING NITROGEN AND METHODS OF USING THE SAME
15/382,114	December 16, 2016	4820.004US1	PROMOTED AMMONIUM SALT-PROTECTED ACTIVATED CARBON SORBENT PARTICLES FOR REMOVAL OF MERCURY FROM GAS STREAMS
15/449,112	March 3, 2017	4820.005US1	SORBENT COMPRISING CARBON AND NITROGEN AND METHODS OF USING THE SAME
12/429,058 8,652,235	April 23, 2009	4820.007US1	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
14/102,896 9,468,886	December 11, 2013	4820.007US2	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/295,594	October 17, 2016	4820.007US3	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPEING APPLICATIONS

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt. 4820.001US7

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

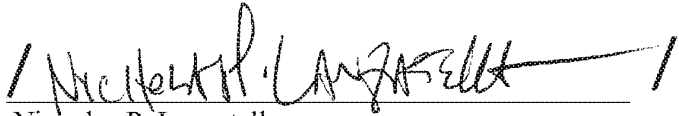
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date _____

By



Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$180.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

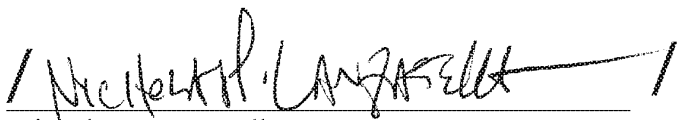
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date _____

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:atl

Electronic Acknowledgement Receipt

EFS ID:	30593263
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	John Nelson Greaves/Annelie Lenasen
Filer Authorized By:	John Nelson Greaves
Attorney Docket Number:	4820.001US7
Receipt Date:	06-OCT-2017
Filing Date:	14-MAY-2015
Time Stamp:	18:03:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	0060_4820001ep1_e2001ar_051110.pdf	596042 5338bbda77901e9d6d836c96d5f25a96ab88d446	no	11

Warnings:

Information:					
2	Non Patent Literature	0061_4820001ep1_eesrr_090911.pdf	2246590	no	20
			dbf6f2e4f65473710cef7a8cd1b2b6807302709c		
Warnings:					
Information:					
3	Non Patent Literature	0062_4820007ep1_decisionogrant_041714.pdf	239199	no	2
			ab8d5c8f914f563c8d568fb015d34b0b17b5a2be		
Warnings:					
Information:					
4	Non Patent Literature	0063_4820007ep1_eesr_120612.pdf	509797	no	5
			fc7313571d520b4054bbc442aebc9cebc74198ba		
Warnings:					
Information:					
5	Non Patent Literature	0064_4820007ep1_e2000c_031714.pdf	7018404	no	44
			a797c419e394e07182b272230cc98adee17d5331		
Warnings:					
Information:					
6	Non Patent Literature	0065_4820007ep1_e2000c_093013.pdf	6728352	no	44
			dea23d33090b34f9cecb085fe9226c2b6898d46b		
Warnings:					
Information:					
7	Non Patent Literature	0066_4820007ep1_aarmisc_020314.pdf	1209098	no	11
			8f60e2f5efd67cdda83552611eef8284b31116cf		
Warnings:					
Information:					
8	Non Patent Literature	0067_4820007ep1_eesrr_062013.pdf	2165247	no	18
			b519b5664aec3e0ab6a1e12ddda4683436fca336		
Warnings:					
Information:					

9	Non Patent Literature	0068_3_4820001ep3_e2001_112612.pdf	325457	no	4
			efef61ba2c34b572bb7775a4ebde70a20bd8dece		
Warnings:					
Information:					
10	Non Patent Literature	0070_1_4820001ep3_eesr_020112.pdf	741116	no	7
			e2379f4a0ad50ee30ff1fea60527badb44b593488		
Warnings:					
Information:					
11	Non Patent Literature	0071_6_4820001ep3_oar_misc_110413.pdf	260076	no	4
			9f95e1fec75da6223fc6350a8abb8880ea3d22a1		
Warnings:					
Information:					
12	Non Patent Literature	0072_4_4820001ep3_e2001r4_020413.pdf	925965	no	9
			c07d1f1ba4e9ff550e8f680229eadd9e21e1b7b		
Warnings:					
Information:					
13	Non Patent Literature	0073_2_4820001ep3_eesrr_082812.pdf	1062358	no	9
			547d20484b86ed969d85890c1c36d0f2d82a3de8		
Warnings:					
Information:					
14	Non Patent Literature	0074_5_4820001ep3_oarmisc_041513.pdf	631889	no	7
			a611d67fcfafc31f56380c1e4ace7fa3e1a94a08		
Warnings:					
Information:					
15	Non Patent Literature	0075_4820001ep2_e2001_010913.pdf	350976	no	4
			595a1555a6782c2f4ed351fbc9a3543aaa4a9d45		
Warnings:					
Information:					

16	Non Patent Literature	0076_4820001ep2_decisionto grant_050214.pdf	240398	no	2
			6c98c23778691c8fea630a25007864b62e691dd6		
Warnings:					
Information:					
17	Non Patent Literature	0077_4820001ep2_eesr_01231 2.pdf	571230	no	6
			669ba3d4ba46f0aa0d57a6962fefe3f74b8748d1		
Warnings:					
Information:					
18	Non Patent Literature	0078_4820001ep2_eesr_05091 2.pdf	1198997	no	12
			44ccb0d0df54b7ee8c637e68b95697f6f23e80596		
Warnings:					
Information:					
19	Non Patent Literature	0079_4820001ep2_e2001_103 013.pdf	250782	no	4
			979fc55dff1243ade4dc075cd450105a3d04476		
Warnings:					
Information:					
20	Non Patent Literature	0080_4820001ep2_oarmisc_12 1113.pdf	608980	no	6
			61a08cef863e05c7c8fc57cdc49b8f3fa5197761		
Warnings:					
Information:					
21	Non Patent Literature	0081_4820001ep2_e2001ar_02 1113.pdf	705957	no	5
			46e47f124159d6286d377a3b484ed8cc9ec977		
Warnings:					
Information:					
22	Non Patent Literature	0082_4820001ep2_aarmisc_10 1013.pdf	2038473	no	18
			8457c748eb5353f43029fb3a917893530985237c		
Warnings:					
Information:					

23	Non Patent Literature	0083_4820001ep2_eesrr_112212.pdf	1553116	no	13
			6e5a319e32381ebc7ecd884dd50d863bd4f5070f		
Warnings:					
Information:					
24	Non Patent Literature	0084_4820001ep2_oarmisc_041513.pdf	598431	no	6
			a9a15a5626a249af4f7d9a54abc99187633a544a		
Warnings:					
Information:					
25	Non Patent Literature	0085_4820001wo1_p326_122706.pdf	462752	no	3
			c12b9faa735be26a0c679bf1f4750f2e5d1bbba5		
Warnings:					
Information:					
26	Non Patent Literature	0086_4820001wo1_p210_072506.pdf	174122	no	2
			1f755355739a3f16dae8391e780b15bc8676654		
Warnings:					
Information:					
27	Non Patent Literature	0087_4820001wo1_p237_072506.pdf	351765	no	3
			7d982234bdd0d6f64aff8aceaba007e3578e7a58		
Warnings:					
Information:					
28	Non Patent Literature	0088_4820007wo1_p326_110311.pdf	623701	no	6
			4ac9368ac2e606569c9a74eadd66645415154bdc		
Warnings:					
Information:					
29	Non Patent Literature	0089_4820007wo1_p210_091310.pdf	350210	no	3
			a4a68a15a457c991f196d67f1513e7f511c143d8		
Warnings:					
Information:					

30	Non Patent Literature	0090_4820007wo1_p237_091310.pdf	453640	no	4
			be56bc0c92af5203a64795d5201391374e858f09		
Warnings:					
Information:					
31	Non Patent Literature	0091_powdered_activated_carbon____cabot_corporation.pdf	469745	no	3
			0b8221044c487e94dd778629b106eda8f020ff33		
Warnings:					
Information:					
32	Non Patent Literature	0092_ha_2005.pdf	116940	no	7
			027d7717b21ba3edc38a3f1564377e3e06d54449		
Warnings:					
Information:					
33	Non Patent Literature	0094_49_2_philadelphia_1004_1107.pdf	250709	no	2
			4d78f37e63650018380a38e1acd6743ee160a7a3		
Warnings:					
Information:					
34	Non Patent Literature	0095_154491121.pdf	171710	no	1
			56879a343b1de7c4a57544b0a58e157ee0cabd11		
Warnings:					
Information:					
35	Non Patent Literature	0096_15449112.pdf	144504	no	1
			64587fe95bfbec3e247020dcd7cad58cf7c7f6a8		
Warnings:					
Information:					
36	Non Patent Literature	0097_alternatives_to_activated_carbon_for_mercury_trol____power_engineering.pdf	2220405	no	10
			88738ecbcd4220e653d0d8167a475a7a62811560		
Warnings:					
Information:					

37	Non Patent Literature	0015_6_4820007us1_oarn_061112.pdf	1756460	no	18
			19847120d528bd9568d1b4ff920170e008d95c19		
Warnings:					
Information:					
38	Non Patent Literature	0038_3338005us6_foar_112516.pdf	2451359	no	25
			accfd8dc0c2d6f7be98288698cc7689fc4d99152		
Warnings:					
Information:					
39	Non Patent Literature	0055_4820001ep1_decisionogrant_060812.pdf	241578	no	2
			05bb271de5119afd41ea1cf7b5c5e7e49197a97b		
Warnings:					
Information:					
40	Non Patent Literature	0093_hocquel_2000.pdf	22571467	no	112
			96c403c9b0f3aefb1f812f8e0125eaaca5fcc8bb		
Warnings:					
Information:					
Total Files Size (in bytes):			65587997		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (j), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT	10/06/2017	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X \$80 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X \$420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE							0

(Column 1) (Column 2) (Column 3)

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

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

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

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

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

LIE
TAMMY D. MCBETH BROWN

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.

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 4		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-2002/01505a1	10/17/2002	Pahlman, John E, et al.
	US-20030057293A1	3/27/2003	Boecking, Friedrich
	US-20070167309A1	7/19/2007	Olson, Edwin S.
	US-20090031708A1	2/5/2009	Schmidt, Darren D.
	US-2,456,272A1	2/7/2002	Pahlman, John, et al.
	US-3,341,185	9/12/1967	Kennedy, Sr, Walter L
	US-3,935,708	2/3/1976	Harrewijne, A., et al.
	US-4,342,192	8/3/1982	Heyn, K., et al.
	US-4,772,455	9/20/1988	Izumi, Kazuo, et al.
	US-4,956,162	9/11/1990	Smith, Wallace B, et al.
	US-5,480,619	1/2/1996	Johnson, Dennis, et al.
	US-5,500,306	3/19/1996	Hsu, M. S., et al.
	US-5,695,726	12/9/1997	Lerner, B J.
	US-6,001,762	12/14/1999	Harmer, Mark Andrew, et al.
	US-6,013,593	1/11/2000	Lee, Hoo-kun, et al.
	US-6,074,974	6/13/2000	Lee, Jung-min, et al.
	US-6,342,462	1/29/2002	Kulprathipanja, Santi
	US-6,475,451	11/5/2002	Leppin, Dennis, et al.
	US-6,576,585	6/10/2003	Fischer, Stefan, et al.
	US-6,579,507	6/17/2003	Pahlman, John, et al.
	US-6,596,661	7/22/2003	Neufert, Ronald
	US-6,610,263	8/26/2003	Pahlman, John, et al.
	US-7,017,330	3/28/2006	Bellows, James C.
	US-7,124,591	10/24/2006	Baer, Joan Mae, et al.
	US-7,247,279	7/24/2007	Pahlman, John, et al.
	US-7,293,414	11/13/2007	Huber, David J.
	US-7,435,286	10/14/2008	Olson, Edwin S., et al.
	US-7,442,239	10/28/2008	Armstrong, J. A., et al.
	US-8,080,088	12/20/2011	Srinivasachar, Srivats
	US-8,173,566	5/8/2012	Olson, Edwin S, et al.
	US-9,662,629	5/30/2017	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2327602A1	6/6/2001	Robles, Antonio	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 4		Attorney Docket No: 4820.001US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CN-101053820A	10/17/2007	Geng, Jianming Qian	
	CN-101293196A	10/29/2008	Zhenglong, Yang	
	CN-101816922A	9/1/2010	Song, Hu, et al.	
	CN-102413899A	4/11/2012	Olson, Edwin S, et al.	
	CN-104519410A	4/15/2015	Olson, Edwin S., et al.	
	CN-104619410B	5/4/2016	Olson, Edwin S, et al.	
	CN-1048173A	1/2/1991	Guoguan, et al.	
	CN-105188910A	12/23/2015	Olson, Edwin S.	
	DE-3816600A1	11/23/1989	Kaizik, Alfred, Dr., et al.	
	EP-1458474	9/22/2004	Hammel, Charles F, et al.	
	JP-09256812	9/30/1997	Masanori, K., et al.	
	JP-544868A	1/13/1979	Seki, Michiharu, et al.	
	KR-1020027006149	7/2/2002	Tsuyoshi, O., et al.	
	WO-0228513A2	4/11/2002	Pahlman, John E, et al.	
	WO-03072241A1	9/4/2003	Hammel, Charles F, et al.	
	WO-2004094024A2	11/4/2004	Olson, Edwin, et al.	
	WO-2009018539A3	2/5/2009	Schmidt, Darren D.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 10/554,018 Response filed 11-01-10 to Final Office Action mailed 04-27-10", 17 pgs	
	"Application Serial No. 10/554,018, Final Office Action mailed 04-27-10", 8 pgs	
	"Application Serial No. 10/554,018, Non Final Office Action mailed 10-06-09", 8 pgs	
	"Application Serial No. 10/554,018, Notice of Allowance mailed 01-19-12", 7 pgs	
	"Application Serial No. 10/554,018, Response filed 02-08-10 to Non Final Office Action mailed 10-06-09", 9 pgs	
	"Application Serial No. 10/554,018, Response filed 08-10-09 to Restriction Requirement mailed 06-09-09", 1 pg	
	"Application Serial No. 10/554,018, Restriction Requirement mailed 06-09-09", 5 pgs	
	"Application Serial No. 12/184,860, Examiner Interview Summary mailed 04-05-11", 3 pgs	
	"Application Serial No. 12/184,860, Final Office Action mailed 05-11-11", 15 pgs	
	"Application Serial No. 12/184,860, Non Final Office Action mailed 01-19-11", 14 pgs	
	"Application Serial No. 12/184,860, Response filed 04-07-11 to Non Final Office Action mailed 01-19-11", 12 pgs	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 3 of 4	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 12/184,860, Response filed 07-08-11 to Final Office Action mailed 05-11-11", 11 pgs	
	"Application Serial No. 14/564,860, Final Office Action mailed 11-17-16", 4 pgs	
	"Application Serial No. 14/564,860, Non Final Office Action mailed 07-12-16", 6 pgs	
	"Application Serial No. 14/564,860, Notice of Allowance mailed 01-30-17", 6 pgs	
	"Application Serial No. 14/564,860, Preliminary Amendment filed 12-10-14", 8 pgs	
	"Application Serial No. 14/564,860, Response filed 05-06-16 to Restriction Requirement mailed 03-16-16", 9 pgs.	
	"Application Serial No. 14/564,860, Response filed 10-03-16 to Non Final Office Action mailed 07-12-16", 11 pgs	
	"Application Serial No. 14/564,860, Restriction Requirement mailed 03-16-16", 5 pgs	
	"Application Serial No. 15/452,527, Preliminary Amendment filed 03-08-17", 3 pgs.	
	"Application Serial No. PCT/US04/12828, International Search Report mailed 10/22/2004", 2 pgs	
	"Application Serial No. PCT/US2014/019916, International Preliminary Report on Patentability mailed 09-17-15", 14 pgs	
	"Canadian Application Serial No. 2,523,132, Office Action mailed 07-18-11", 3 pgs	
	"Canadian Application Serial No. 2,523,132, Response filed 01-16-12 to Office Action mailed 7-18-11", 5 pgs	
	"Canadian Application Serial No. 2,707,363, First Examiners Report Received 6/16/11", 2 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 02-26-16 to Office Action mailed 09-09-15", 13 pgs.	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 09-09-15", 3 pgs	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 12-22-16", 5 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 08-28-15 to Canadian Office Action mailed 04-02-15", 22 pgs	
	"Chinese Application Serial No. 200480017704.4, Office Action mailed 12-08-11", (w/ English Translation), 6 pgs	
	"Chinese Application Serial No. 200480017704.4, Response filed 01-20-12 to Office Action mailed 12-08-12", (w/ English Translation of Amended Claims), 10 pgs.	
	"Chinese Application Serial No. 201380033231.6, Office Action mailed 09-21-15", w/ Partial English Translation, 6 pgs	
	"Chinese Application Serial No. 201380033231.6, Response filed 01-14-16 to Office Action mailed 09-21-15", w/English Claims, 7 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 07-12-17", W/ English Translation, 8 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 07-25-16", (With English Translation), 4 pgs	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 4 of 4	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 12-23-16", 24 pgs.	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 12-23-16", W/ English Translation, 39 pgs	
	"Chinese Application Serial No. 201480025701.9, Response filed 09-15-17 to Office Action mailed 07-12-17", w/ English Translation, 21 pgs	
	"European Application Serial No. 13719338.9, Office Action mailed 05-12-17", 6 pgs	
	"European Application Serial No. 13719338.9, Office Action mailed 12-19-14", 2 pgs.	
	"European Application Serial No. 13719338.9, Response filed 06-29-15 to Office Action mailed 12-19-14", 19 pgs.	
	"European Application Serial No. 14711106.6, Communication Pursuant to Article 94(3) EPC mailed 02-22-17", 6 pgs	
	"European Application Serial No. 14711106.6, Response filed 08-17-17 to Communication Pursuant to Article 94(3) EPC mailed 02-22-17", 10 pgs	
	"International Application No. PCT/US2008/071986, International Search Report mailed 01-30-09", 3 pgs	
	OLSON, DAVID, et al., "The reduction of gas phase air toxics from combustion and incineration sources using the MET-Mitsui-BF activated coke process", Fuel Processing Technology, (2000), 13 pgs	
	STRENG, SABINE, et al., "Toxics control by activated charcoal within the "System Dusseldorf" full scale experience", B. Fuel Processing Technology, (1994), 14 pgs	
	TSUJI, K, et al., "The Activated Coke Process for Combined SOx/NOx/Air Toxics Reduction", Air and Water Management Assoc., (March 10, 1993), 27 pgs	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$180.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

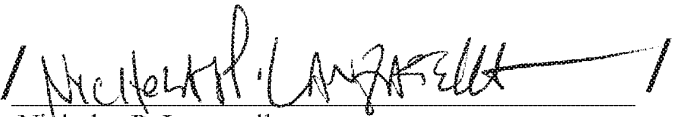
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 12/04/17

By



Nicholas P. Lanzatella
Reg. No. 63,803

NPL:atl

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPEING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

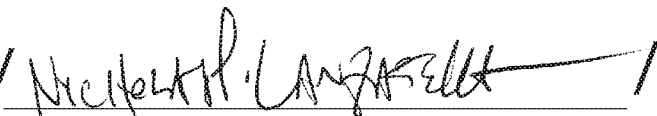
<u>Serial No./</u> <u>Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
12/429,058 8,652,235	April 23, 2009	4820.007US1	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 12/04/17

By



Nicholas P. Lanzatella

Reg. No. 63,803

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

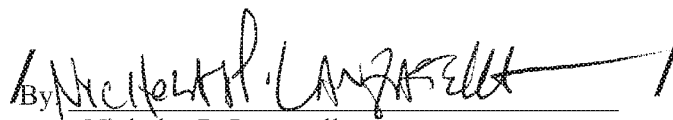
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Communication Concerning Prior and Copending Applications (1 pg.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (4 pgs.) Copies of Cited References (65).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$180.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By 
Nicholas P. Lanzatella
Reg. No. 63,803

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		John Nelson Greaves/Annelie Lenasen		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt	
EFS ID:	31122261
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	John Nelson Greaves/Annelie Lenasen
Filer Authorized By:	John Nelson Greaves
Attorney Docket Number:	4820.001US7
Receipt Date:	04-DEC-2017
Filing Date:	14-MAY-2015
Time Stamp:	17:25:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	120517INTEFSW00004485190743
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		14712558_sids_12-04-17.pdf	240478	yes	8
			945bbb600106b5cacd190fce117285d99e41cbbf		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Information Disclosure Statement (IDS) Form (SB08)		5	8	
	Transmittal Letter		3	4	
	Miscellaneous Incoming Letter		2	2	
	Miscellaneous Incoming Letter		1	1	
Warnings:					
Information:					
2	Foreign Reference	0001_ca2327602a1.pdf	2122402	no	23
			5a8420bd2646f8a4a1e96f05720d30a967b5fe6a		
Warnings:					
Information:					
3	Foreign Reference	0002_cn101053820a.pdf	2272792	no	13
			94b288bcc39f28aa0eb398d88bcb06463fff6115		
Warnings:					
Information:					
4	Foreign Reference	0003_cn101293196a.pdf	1965744	no	10
			8d31d39b25392e3ea831cfdcb76f2d48e2bdf186		
Warnings:					
Information:					

5	Foreign Reference	0005_cn102413899a.pdf	5269846	no	28
			52d954e674773d99673037c0a31911b79083c33e		
Warnings:					
Information:					
6	Foreign Reference	0006_cn104519410a.pdf	6601086	no	36
			9f5dca9f97d9716de12a487c87a537927a10e328		
Warnings:					
Information:					
7	Foreign Reference	0007_cn104619410b.pdf	6148568	no	34
			452e7c8323b146f92d7e476093fae449c31ce88af		
Warnings:					
Information:					
8	Foreign Reference	0008_cn1048173a.pdf	1031517	no	8
			ec53d23a7872098090423561625b071daf98bfe0		
Warnings:					
Information:					
9	Foreign Reference	0009_cn105188910a.pdf	624093	no	32
			16519d071476c331bc735c6930379fd04f9bc887		
Warnings:					
Information:					
10	Foreign Reference	0010_de3816600a1.pdf	1580165	no	13
			79e13e49bd57982db29fad91ab9c48bee94c4e20		
Warnings:					
Information:					
11	Foreign Reference	0011_ep1458474a1.pdf	55078	no	1
			38939275cc66e8d4c1e823f5a2b692ab889671e5		
Warnings:					
Information:					

12	Foreign Reference	0012_japanese09256812.pdf	89981	no	1
			f28e9598205f8294c01711e4d8a99571587e74db		
Warnings:					
Information:					
13	Foreign Reference	0014_korean_1020020052209.pdf	282285	no	3
			880708b233173717d94c525b298bd72184e8d9db		
Warnings:					
Information:					
14	Foreign Reference	0015_wo2002028513a2.pdf	12606970	no	88
			d31d8282f93a8d77506b90031ac19dd43ab591de		
Warnings:					
Information:					
15	Foreign Reference	0017_wo2004094024a2.pdf	2894248	no	26
			38ea5f374cf48b6a6627966832890918a8a53094		
Warnings:					
Information:					
16	Foreign Reference	0018_wo2009018539a3.pdf	379508	no	3
			a3492e442f80535a6847b2b2e453020f07642cc7		
Warnings:					
Information:					
17	Non Patent Literature	0019_3338013us1_aarn_110110.pdf	1683177	no	17
			16f0644cb9c36d45f6edda0c5aec641db2ad487f		
Warnings:					
Information:					
18	Non Patent Literature	0020_3338013us1_foar_042710.pdf	604965	no	8
			d33fc3ce4b3d75cb0785c47ef8fd1f43a3a5609b		
Warnings:					
Information:					

19	Non Patent Literature	0021_3338013us1_oarn_100609.pdf	643803	no	8
			20c8db63f1e61f76d487ebe78b4c056f7c657b8		
Warnings:					
Information:					
20	Non Patent Literature	0022_10554018_noar_011912.pdf	924533	no	7
			367d067c489c32dcef5cb91f1527c1a114755e07		
Warnings:					
Information:					
21	Non Patent Literature	0023_3338013us1_aarn_020810.pdf	705851	no	9
			fb071932e4bce5232bce549d82442c0d575bab09		
Warnings:					
Information:					
22	Non Patent Literature	0024_3338013us1_rerr_r_081009.pdf	81925	no	1
			34b8cb3dee0da4be2a9b39a630e8671afbc2ff7a		
Warnings:					
Information:					
23	Non Patent Literature	0025_3338013us1_rerr_060909.pdf	417952	no	5
			e146487e10bcd6793c810afec8f3d8aa08ce7cd		
Warnings:					
Information:					
24	Non Patent Literature	0026_3338002us1exir4511.pdf	402687	no	3
			11b941d5623f6ac3ee058d1e63eccc41ff6f3359		
Warnings:					
Information:					
25	Non Patent Literature	0027_3338002us1_foar_051111.pdf	1761768	no	15
			82ab2ddd49735e4812c0dfeed0b80a7d26fd0349		
Warnings:					
Information:					

26	Non Patent Literature	0028_3338002us1_oarn_011911.pdf	1489189	no	14
			55ff369b4ad8019b09ce6f99839c7ffa9d07384d		
Warnings:					
Information:					
27	Non Patent Literature	0029_3338002us1_aarn_040711.pdf	355860	no	12
			e54711e91dd1d77e246f44ba0607eb07a4be90dc		
Warnings:					
Information:					
28	Non Patent Literature	0030_3338002us1_aarf_070811.pdf	95670	no	11
			c3a81b47a332a45380836029f46afbc1bfb31d74		
Warnings:					
Information:					
29	Non Patent Literature	0032_3338016us2_oarn_071216.pdf	813656	no	6
			93c6795ac07b0ebaf54b9995a9d60c115ab5a55c		
Warnings:					
Information:					
30	Non Patent Literature	0033_3338016us2_noar_013017.pdf	1104128	no	6
			7f79724e2621c3e07406ad1fa3bce0c73c723568		
Warnings:					
Information:					
31	Non Patent Literature	0034_3338016us2_pamd_121014.pdf	421837	no	6
			b7e15b3a708bf8a305d2fccfa2ea222a2ac931b9		
Warnings:					
Information:					
32	Non Patent Literature	0035_3338016us2_rrr1mo_050616.pdf	125961	no	9
			66d0e5e221304dde999d12cbf5ea1a968ba693e6		
Warnings:					
Information:					

33	Non Patent Literature	0037_3338016us2_rerr_031616.pdf	703013	no	5
			701e0cd3ffacfedc5338bf05b9304757967ce7fc		
Warnings:					
Information:					
34	Non Patent Literature	0038_3338016us3_pamd_030817.pdf	44189	no	3
			852a53be61ea18dd60d8ce2951c033bf316a1424		
Warnings:					
Information:					
35	Non Patent Literature	0040_3338021wo1_p326_091715.pdf	1876646	no	14
			a794979be3c58a9e127ffd316a272ec0cf608bf8		
Warnings:					
Information:					
36	Non Patent Literature	0041_ca_oa_7_18_11.pdf	1193832	no	3
			b2d6e4b09a35d742497b5042bd14e235d86c146a		
Warnings:					
Information:					
37	Non Patent Literature	0042_ca_response_1_16_12.pdf	110565	no	5
			de12166899056fe69a7b2a75ae4a6f1c648bbfb19		
Warnings:					
Information:					
38	Non Patent Literature	0043_3338002ca1.pdf	235446	no	2
			5928741a2952bf8ddac71a8b193d65112018e297		
Warnings:					
Information:					
39	Non Patent Literature	0044_ca_response_02_26_16.pdf	633364	no	13
			fb098805038aff060c575753d79b5ec5b30d2777		
Warnings:					
Information:					

40	Non Patent Literature	0045_ca_office_action_09_09_15.pdf	1142412	no	3
			6946a0d222402daa6927c9e74265655333ed7a55		
Warnings:					
Information:					
41	Non Patent Literature	0046_3338016ca1_oarmisc_12_2216.pdf	1805782	no	5
			ae55d2fabaeecd4e491ebf052334b76cb3bfae55d2fabaeecd4e491ebf052334b76cb3bf444b		
Warnings:					
Information:					
42	Non Patent Literature	0047_ca_response_08_28_15.pdf	1384221	no	22
			095f0b4c9c6bcd5e756b51c8852ddf93b9c798b6		
Warnings:					
Information:					
43	Non Patent Literature	0048_cn_notice_12_8_11.pdf	590918	no	6
			8799ecf11230252b6cbe8a6131c19a2591d89a69		
Warnings:					
Information:					
44	Non Patent Literature	0049_cn_response_1_20_12.pdf	163517	no	10
			6ff6729f1d2a31874a05aeda09407f6b9e0aa1d		
Warnings:					
Information:					
45	Non Patent Literature	0050_cn_officez_action_09_21_15.pdf	1442092	no	6
			fe21b0dec3a6536f18dbced15e179ba0d4003552		
Warnings:					
Information:					
46	Non Patent Literature	0051_3338016cn1_aarmisc_01_1416.pdf	287180	no	7
			030cb6ecb1782f457248ba36a6c5bcf11a886f12		
Warnings:					
Information:					

47	Non Patent Literature	0052_4820003cn1_oarmisc_071217.pdf	696186	no	8
			83aa00f4a6ea6b3ffeee08a9eac8335ae9fc20f0		
Warnings:					
Information:					
48	Non Patent Literature	0053_3338021cn1_oarmisc_072516.pdf	382492	no	4
			56055e74d4e7619641ee79fb9cb2b93b198f9fa1		
Warnings:					
Information:					
49	Non Patent Literature	0054_pages_from_2014800257019aarmiscsolidated_correspondence_041217_137201704112.pdf	1654902	no	24
			a4494d47c8b3bef58015bccd9f5f9e0c7e1a7dd1		
Warnings:					
Information:					
50	Non Patent Literature	0055_3338021cn1_oarmisc_122316.pdf	3199692	no	39
			3868e673b241df5d68498d6e672bc020f1f61537		
Warnings:					
Information:					
51	Non Patent Literature	0056_2014800257019aarmisc_092017_20170915.pdf	1375383	no	21
			2224a1e9b79fe5b281ee78cb3dc2d78ec478a489		
Warnings:					
Information:					
52	Non Patent Literature	0057_3338016ep1_oarmisc_051217.pdf	753513	no	6
			b55caf1dfbc08acc636a31e1eaaa71992c0d51b9		
Warnings:					
Information:					
53	Non Patent Literature	0058_ep_oa_12_19_2014.pdf	394878	no	2
			53360560ba6f424c1cff6d5d26dc1b0354e1fb10		
Warnings:					
Information:					

54	Non Patent Literature	0059_ep_response_06_29_2015.pdf	5327099 3daabc69c48db2a58c232524750aa7c018318ece	no	19
Warnings:					
Information:					
55	Non Patent Literature	0060_3338021ep1_e2001_022217.pdf	693990 821b764432d532c83147743e0e460826c6a9c344	no	6
Warnings:					
Information:					
56	Fee Worksheet (SB06)	fee-info.pdf	30741 2e6b1ceb6de15e69a55f6d884418803d3adfdb15	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			81919776		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Electronic Acknowledgement Receipt

EFS ID:	31122446
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	John Nelson Greaves/Annelie Lenasen
Filer Authorized By:	John Nelson Greaves
Attorney Docket Number:	4820.001US7
Receipt Date:	04-DEC-2017
Filing Date:	14-MAY-2015
Time Stamp:	17:34:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment		no			
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	0061_147111066e2001r4_0817 17_20170222.pdf	232354	no	10
			8dc18597eca7b63ee4c1e8c22cb38882c17fbc8c		
Warnings:					

Information:					
2	Non Patent Literature	0062_2008071986_pct_13009.pdf	330236	no	3
			a8ee9d3d22564138bfa4631a3060674acd4b1352		
Warnings:					
Information:					
3	Non Patent Literature	0063_3338013us1_olson_reduction_111808.pdf	2211800	no	13
			0c607f19c001815470952a635df2ba0911c99170		
Warnings:					
Information:					
4	Non Patent Literature	0065_3338013us1_tsuji_coke_process_111808.pdf	4198252	no	27
			ff3bd687950476286691c03f5c73eb5c536affa2		
Warnings:					
Information:					
5	Foreign Reference	0004_cn_101816922a.pdf	1574442	no	7
			bc06c36e71a869c0195a88d42b1c4fa4223ab34a		
Warnings:					
Information:					
6	Foreign Reference	0013_jps544868a.pdf	1029964	no	6
			c9b3b173e34cff917ec8b5ae22d2fa3b8912817		
Warnings:					
Information:					
7	Foreign Reference	0016_wo2003072241a1.pdf	8391907	no	59
			040b7e0b2ee03fa0a501d52a9346777d87786ae		
Warnings:					
Information:					
8	Non Patent Literature	0031_3338016us2_foar_111716.pdf	573454	no	4
			9a7ffc57f3a8aabbec1c88d04e3968d8b74b6e94		
Warnings:					
Information:					

9	Non Patent Literature	0036_3338016us2_aarn_100316.pdf	1046664 4e46742a18531b83a6f9ead3ec12025dff1519a2	no	11
Warnings:					
Information:					
10	Non Patent Literature	0037_3338016us2_rerr_031616.pdf	703013 701e0cd3ffacfedc5338bf05b9304757967ce7fc	no	5
Warnings:					
Information:					
Total Files Size (in bytes):			20292086		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 5		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20020033097A1	3/21/2002	El-shoubary, Youssef, et al.
	US-20030206843A1	11/6/2003	Sidney Jr, Nelson G
	US-20030206846A1	11/6/2003	Jangbarwala, Juzer
	US-20040109800	6/10/2004	Pahlman, John E, et al.
	US-20050000197A1	1/6/2005	Krantz, Jeffrey
	US-20050074380A1	4/7/2005	Boren, Richard M, et al.
	US-20050147549A1	7/7/2005	Lissianski, Vitali Victor, et al.
	US-20050227146A1	10/13/2005	Ghantous, Dania, et al.
	US-20060057044A1	3/16/2006	Chang, Shih-ger, et al.
	US-20060112823A1	6/1/2006	Avina, David Christopher
	US-20060204418A1	9/14/2006	Chao, Chien-chung, et al.
	US-20070168213A1	7/19/2007	Comrie, Douglas C
	US-20070234902A1	10/11/2007	Fair, David L, et al.
	US-20070295347A1	12/27/2007	Paine III, John B, et al.
	US-20080134888A1	6/12/2008	Chao, Chien-chung, et al.
	US-20080207443A1	8/28/2008	Gadkaree, Kishor Purushottam, et al.
	US-20090081092A1	3/26/2009	Yang, Xiaolin David, et al.
	US-20170100692A1	4/13/2017	Olson, Edwin S, et al.
	US-20170128908A1	5/11/2017	Olson, Edwin S., et al.
	US-20170173557A1	6/22/2017	Olson, Edwin S, et al.
	US-20170239644A1	8/24/2017	Olson, Edwin S, et al.
	US-4,530,765	7/23/1985	Sabherwal, Inderjit H
	US-5,245,120	9/14/1993	Srinivasachar, Srivats, et al.
	US-5,288,306	2/22/1994	Aibe, Toshio, et al.
	US-5,346,674	9/13/1994	Weinwurm, Peter, et al.
	US-5,419,834	5/30/1995	Straten, Gunter
	US-5,435,980	7/25/1995	Felsvang, Karsten S, et al.
	US-7,938,571	5/10/2011	Irvine, James H
	US-7,942,566	5/17/2011	Irvine, James H
	US-9,468,886	10/18/2016	Olson, Edwin S, et al.
	US-9,669,355	6/6/2017	Olson, Edwin S, et al.
	US-9,757,689	9/12/2017	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

12/01/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 5	Attorney Docket No: 4820.001US7	

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2584327A1	4/13/2006	Pavlish, John H, et al.	
	CN-101048218A	10/3/2007	Olson, Edwin S, et al.	
	EP-1386655A1	2/4/2004	Vosteen, Vosteen Bernhard, et al.	
	GB-2122916A	1/25/1984	Nishino, Hiroshi, et al.	
	JP-50145324A	3/3/1980		
	WO-2006039007A2	4/13/2006	Olson, Edwin S, et al.	
	WO-2006039007A3	4/13/2006	Olson, Edwin S, et al.	
	WO-2006099611A1	9/21/2006	Comrie, Douglas C, et al.	
	WO-2010123609A1	10/28/2010	Olson, Edwin S, et al.	
OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 12/429,058, Advisory Action mailed 05-29-12", 3 pgs			
	"Application Serial No. 12/429,058, Ex Parte Quayle Action mailed 02-14-13", 7 pgs			
	"Application Serial No. 12/429,058, Examiner Interview Summary mailed 12-28-12", 4 pgs			
	"Application Serial No. 12/429,058, Final Office Action mailed 10-31-12", 21 pgs			
	"Application Serial No. 12/429,058, Final Office Action mailed 12-20-11", 21 pgs			
	"Application Serial No. 12/429,058, Non Final Office Action mailed 06-11-12", 18 pgs			
	"Application Serial No. 12/429,058, Non Final Office Action mailed 07-19-11", 20 pgs			
	"Application Serial No. 12/429,058, Notice of Allowance mailed 01-16-14", 5 pgs			
	"Application Serial No. 12/429,058, Notice of Allowance mailed 09-11-13", 11 pgs			
	"Application Serial No. 12/429,058, Response filed 01-31-13 to Final Office Action mailed 10-31-12", 19 pgs			
	"Application Serial No. 12/429,058, Response filed 03-07-13 to Ex Parte Quayle Action mailed 02-14-13", 7 pgs			
	"Application Serial No. 12/429,058, Response filed 05-11-12 to Final Office Action mailed 12-20-11", 11 pgs			
	"Application Serial No. 12/429,058, Response filed 09-11-12 to Non Final Office Action mailed 06-11-12", 16 pgs			
	"Application Serial No. 12/429,058, Response filed 10-18-11 to Non Final Office Action mailed 07-19-11", 17 pgs			
	"Application Serial No. 14/102,896, Advisory Action mailed 12-16-15", 3 pgs			
	"Application Serial No. 14/102,896, Final Office Action mailed 08-26-15", 12 pgs			
	"Application Serial No. 14/102,896, Non Final Office Action mailed 03-23-15", 13 pgs			
	"Application Serial No. 14/102,896, Notice of Allowance mailed 06-10-16", 7 pgs			
	"Application Serial No. 14/102,896, Response filed 01-22-16 to Advisory Action mailed 12-16-15", 11 pgs			

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 12/01/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 3 of 5	Attorney Docket No: 4820.001US7	

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	"Application Serial No. 14/102,896, Response filed 06-22-15 to Non Final Office Action mailed 03-23-15", 10 pgs			
	"Application Serial No. 14/102,896, Response filed 11-24-15 to Final Office Action mailed 08-26-15", 5 pgs			
	"Application Serial No. 14/195,360, Corrected Notice of Allowance mailed 02-27-17", 2 pgs			
	"Application Serial No. 14/195,360, Corrected Notice of Allowance mailed 03-29-17", 2 pgs			
	"Application Serial No. 14/195,360, Final Office Action mailed 11-22-16", 7 pgs			
	"Application Serial No. 14/195,360, Notice of Allowance mailed 02-07-17", 5 pgs			
	"Application Serial No. 14/195,360, Response filed 01-18-17 to Final Office Action mailed 11-22-16", 7 pgs			
	"Application Serial No. 14/318,270, Advisory Action mailed 02-17-17", 4 pgs			
	"Application Serial No. 14/318,270, Corrected Notice of Allowance mailed 05-22-17", 2 pgs			
	"Application Serial No. 14/318,270, Final Office Action mailed 11-25-16", 25 pgs			
	"Application Serial No. 14/318,270, Notice of Allowance mailed 05-15-17", 8 pgs			
	"Application Serial No. 14/318,270, Response filed 01-25-17 to Final Office Action mailed 11-25-16", 14 pgs			
	"Application Serial No. 14/318,270, Response filed 02-27-17 to Final Office Action mailed 11-25-16", 15 pgs			
	"Application Serial No. 15/295,594, Preliminary Amendment filed 01-26-17", 8 pgs			
	"Application Serial No. 15/295,594, Preliminary Amendment filed 06-13-17", 7 pgs			
	"Application Serial No. 15/382,114, Preliminary Amendment filed 04-04-17", 3 pgs			
	"Application Serial No. 15/449,112, Non Final Office Action mailed 09-27-17", 17 pgs			
	"Canadian Application Serial No. 2,584,327, Office Action mailed 12-07-09", 2 pgs			
	"Canadian Application Serial No. 2,584,327, Response filed 03-19-10 to Office Action mailed 12-07-09", 8 pgs			
	"Canadian Application Serial No. 2,584,327, Response filed 09-02-09 to Office Action mailed 03-03-09", 21 pgs			
	"Canadian Application Serial No. 2,757,309, Office Action mailed 12-07-15", 3 pgs			
	"Canadian Application Serial No. 2,757,309, Response filed 06-06-16 to Office Action mailed 12-07-15", 13 pgs			
	"Canadian Application Serial No. 2,757,309, Voluntary Amendment filed 01-30-15", 27 pgs			
	"Chinese Application Serial No. 200580037037.0, Chinese Office Action, dated June 25, 2013 (and English translation)", no english translation, 46 pgs			
	"DARCO® FGD- Powdered Activated Carbon", Norit Americas Inc. Datasheet No. 1100, (May 2009), 1 pg			
	"European Application Serial No. 05814011.2, Communication Pursuant to Article 94(3) EPC mailed 11-05-09", 4 pgs			
	"European Application Serial No. 05814011.2, Decision to grant mailed 06-08-12", 2 pgs			

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 12/01/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 4 of 5	Attorney Docket No: 4820.001US7	

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	"European Application Serial No. 05814011.2, Extended European Search Report mailed 04-14-09", 13 pgs			
	"European Application Serial No. 05814011.2, Office Action mailed 01-31-12", 4 pgs			
	"European Application Serial No. 05814011.2, Office Action mailed 04-27-12", 6 pgs			
	"European Application Serial No. 05814011.2, Response filed 02-28-12 to Office Action mailed 01-31-12", 30 pgs			
	"European Application Serial No. 05814011.2, Response filed 05-11-10 to Communication Pursuant to Article 94(3) EPC mailed 11-05-09", 11 pgs			
	"European Application Serial No. 05814011.2, Response filed 09-09-11 to Extended European Search Report mailed 04-14-09", 20 pgs			
	"European Application Serial No. 10767465.7, Decision to grant mailed 04-17-14", 2 pgs			
	"European Application Serial No. 10767465.7, Extended European Search Report mailed 12-06-12", 5 pgs			
	"European Application Serial No. 10767465.7, Intention to Grant mailed 03-17-14", 44 pgs			
	"European Application Serial No. 10767465.7, Intention to Grant mailed 09-30-13", 44 pgs			
	"European Application Serial No. 10767465.7, Response filed 02-03-14 to Intention to Grant mailed 09-30-13", 11 pgs			
	"European Application Serial No. 10767465.7, Response filed 06-20-13 to Extended European Search Report mailed 12-06-12", 18 pgs			
	"European Application Serial No. 11189249.3, Communication Pursuant to Article 94(3) EPC mailed 11-26-12", 4 pgs			
	"European Application Serial No. 11189249.3, Decision to Refuse mailed 12-19-13", 18 pgs			
	"European Application Serial No. 11189249.3, Extended European Search Report mailed 02-01-12", 7 pgs			
	"European Application Serial No. 11189249.3, Office Action mailed 11-04-13", 4 pgs			
	"European Application Serial No. 11189249.3, Response filed 02-04-13 to Communication Pursuant to Article 94(3) EPC mailed 11-26-12", 9 pgs			
	"European Application Serial No. 11189249.3, Response filed 08-28-12 to Extended European Search Report mailed 02-01-12", 9 pgs			
	"European Application Serial No. 11189249.3, Summons to Attend Oral Proceedings mailed 04-15-13", 7 pgs			
	"European Application Serial No. 11189252.7, Communication Pursuant to Article 94(3) EPC mailed 01-09-13", 4 pgs			
	"European Application Serial No. 11189252.7, Decision to grant mailed 05-02-14", 2 pgs			
	"European Application Serial No. 11189252.7, Extended European Search Report mailed 01-23-12", 6 pgs			
	"European Application Serial No. 11189252.7, Extended European Search Report mailed 05-09-12", 12 pgs			
	"European Application Serial No. 11189252.7, Office Action mailed 10-30-13", 4 pgs			

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 12/01/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 5 of 5	Attorney Docket No: 4820.001US7	

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	"European Application Serial No. 11189252.7, Office Action mailed 12-11-13", 6 pgs			
	"European Application Serial No. 11189252.7, Response filed 02-11-13 to Communication Pursuant to Article 94(3) EPC mailed 01-09-13", 5 pgs			
	"European Application Serial No. 11189252.7, Response filed 10-10-13 to Office Action mailed 04-15-13", 18 pgs			
	"European Application Serial No. 11189252.7, Response filed 11-22-12 to Extended European Search Report mailed 05-09-12", 13 pgs			
	"European Application Serial No. 11189252.7, Summons to Attend Oral Proceedings mailed 04-15-13", 6 pgs			
	"International Application Serial No. PCT/US2005/030018, International Preliminary Report on Patentability mailed 12-27-06", 3 pgs			
	"International Application Serial No. PCT/US2005/030018, International Search Report mailed 07-25-06", 2 pgs			
	"International Application Serial No. PCT/US2005/030018, Written Opinion mailed 07-25-06", 3 pgs			
	"International Application Serial No. PCT/US2010/022807, International Preliminary Report on Patentability mailed 11-03-11", 6 pgs			
	"International Application Serial No. PCT/US2010/022807, International Search Report mailed 09-13-10", 3 pgs			
	"International Application Serial No. PCT/US2010/022807, Written Opinion mailed 09-13-10", 4 pgs			
	"Powdered Activated Carbon", Cabot Corp, [Online] retrieved from the internet: < http://www.cabotcorp.com/solutions/products-plus/activated-carbon/powdered >, (01/03/15), 3 pgs			
	HA, et al., "Effect of unburnt carbon on the corrosion performance of fly ash cement mortar", Construction and Building Materials, (09/01/2005), 7 pgs			
	M, HOCQUEL, "Quecksilber und seine Verbindungen bei der Abfallverbrennung", with English Abstract pg 3, (12/31/2000), 112 pgs			
	MAROTO-VALER, M. MERCEDES, et al., "DEVELOPMENT OF ACTIVATED CARBONS FROM COAL AND BIOMASS COMBUSTION AND GASIFICATION CHARs", (2004), 2 pgs			
	PADAK, BIHTER, "Understanding mercury binding on activated carbon", Carbon 47.1 2, (2009), 2855-2864			
	PRZEPIORSKI, J, et al., "High temperature ammonia treatment of activated carbon for enhancement of CO2 adsorption", Applied Surface Science 225.1, (2004), 235-242			
	SMOKEY, et al., "Alternative to Activated Carbon for Mercury Control", Power Engineering, (Oct 2012), 10 pgs			

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 12/01/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

Search Notes 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10		

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
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	12/01/2017	AO
Inventor Search (DAV)	12/01/2017	AO

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

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	230	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/12/01 14:36
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10,	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:49

		B01D53/10).cpc. and (halogen or halide of HBr) with sorbent				
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:18

S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:22
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S40	65	"40" microns and olson.in.	US-PGPUB;	ADJ	ON	2016/11/16

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			11:06
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2016/11/16 11:28

			IBM_TDB			
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54
S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10,	US-PGPUB; USPAT	ADJ	ON	2016/11/16 15:23

		B01D53/10).cpc. and (halogen or halide of HBr) with sorbent				
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787" "3194629" "3662523" "3786619"	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20

		"3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.				
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31
S79	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
S80	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358" "6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41
S81	593	honeycomb with plug\$4 and plug\$4 with length	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S82	0	honeycomb with plug\$4 and plug\$4 with length with less than with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S83	0	honeycomb with plug\$4 and plug\$4 with length with less than	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S84	127	honeycomb with plug\$4 and plug\$4 with	US-PGPUB;	ADJ	ON	2017/06/27

		length with "5"	USPAT			14:46
S85	241	honeycomb with plug\$4 and plug\$4 with length with mm	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:47
S86	41	honeycomb with plug\$4 and plug\$4 with length with "3 mm "	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:49
S87	28	honeycomb with plug\$4 and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:52
S88	28	honeycomb and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:53
S89	43	honeycomb and plug\$4 with porosity with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:06
S90	20	honeycomb and plug\$4 with pore (size or diameter) with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:07
S91	8	saw with honeycomb with filter	US-PGPUB; USPAT	ADJ	ON	2017/06/29 13:31

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S4	0	(activated carbon and non-carbon sorbent and carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2013/09/09 09:20
S5	1	(activated carbon and carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2013/09/09 09:20
S6	1	(carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2013/09/09 09:20
S23	1	(activated carbon and non-carbon sorbent and carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2016/06/07 09:06
S24	2	(carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2016/06/07 09:06
S31	1	(activated carbon and non-carbon sorbent and carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2016/09/30 13:48
S32	2	(carbon sorbent and mercury and halogen and promoter).clm.	USPAT	ADJ	ON	2016/09/30 13:48
S74	0	(sorbent and halocarbond and mean particle size).clm.	USPAT	ADJ	ON	2017/05/10 11:03
S75	0	(sorbent and halocarbon and mean particle size).clm.	USPAT	ADJ	ON	2017/05/10 11:03
S76	1	(sorbent and mean particle size and breakthrough).clm.	USPAT	ADJ	ON	2017/05/10 11:03
S77	5	(sorbent and halocarbon).clm.	USPAT	ADJ	ON	2017/05/10 11:05
S78	17	olson.in. and halocarbon	USPAT	ADJ	ON	2017/05/10 11:06

12/1/2017 2:43:01 PM**C:\Users\amillerharris\Documents\EAST\Workspaces\12429058.wsp**



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	12/06/2017		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			12/06/2017	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):

uspto@slwip.com
SLW@blackhillsip.com

DETAILED ACTION

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, 365(c), or 386(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosure of the prior-filed application, Application No. 14/318270, fails to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. Claims 2-20, combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof and subsequently reacting the promoter with particulate sorbent material (claim 2) and subsequent claimed subject matter of claims 3-5 which pertain the coal comprising at promoter are not disclosed within the prior-filed application. Claims 6-20 depend from claim 2. Claim 21, the limitation "adding a promoter to coal, wherein the promoter is chosen from Br₂, HBr, and combinations thereof: combusting the coal to form the mercury-containing gas" and subsequently reacting the promoter with particulate sorbent material are not disclosed within the prior-filed application.

The applicant has pointed to 60/605,640 that discloses the below figure:

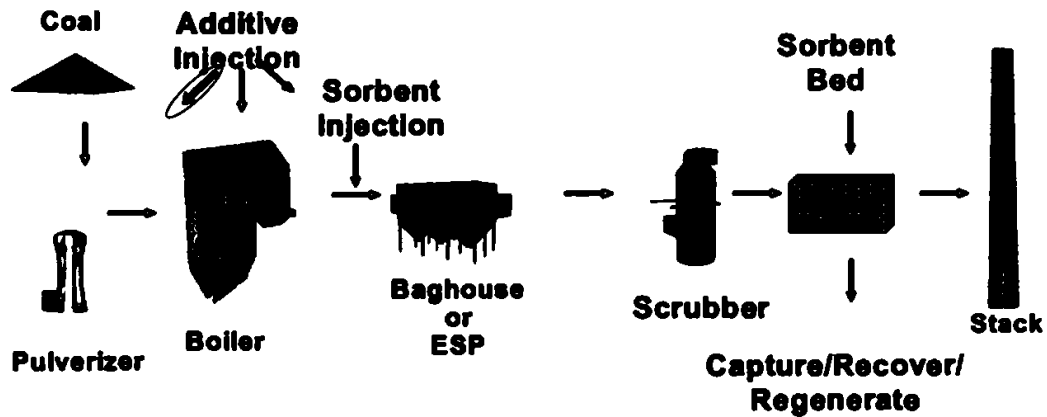


FIG. 2

Pointing to the left most arrow (circled above) and stating that the scope of the “additive of the ‘640 application is commensurate with that of the “promoter” in the instant application.

The examiner disagrees. The ‘640 specification mentions “additives” in the Abstract, Item 2 (page 3 of 17), item 9 (page 4 of 17), “Description of the Invention” (page 6 of 17).

The Abstract states that additives are of base chemistry (Ca, Na, and others) and does not disclose that the additives are the promoters of the currently claimed invention.

Item 2 teaches the “Same additives as 1E”: referring to 1E which includes some of the promoters of the currently claimed invention. That being said none of the additives in Item 1E or 2 are being mixed with coal and no reference is made to figure 2 (i.e. the figure above) in either instance.

Item 9 teaches additives (1-8). Items 1-8 detail carbon which is promoted, and not to the promoter itself. Item 9 goes on to state “additive is a compound comprised of Group I or II elements”, but does not disclose the additives are the promoters of the currently claimed invention.

The “Description of the Invention” discloses “a sorbent and/or a combination of additives” to remove pollutants from the gas stream. This appears to suggest that the additives are optional. The

specification discloses the inventive nature of the application is to promote the carbon sorbent and is not optional.

Further the "Carbon Sorbent" is detailed on pages 13 and 14 of 17 and discloses that the carbon sorbent is a promoted sorbet (i.e. reaction of halogens and acidic species with the basic binding sites on the active carbon sorbent). Giving weight to the "Sorbent Injection" in figure 2 (the above figure) is the "Carbon Sorbent" and the Additive is not the promoter as claimed in the current invention.

Specification

The amendment filed 10/06/2017 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the applicant includes an additional embodiment "In an embodiment, coal and promoter can be present as a mixture. The promoter and the coal can be mixed before combustion of the coal at a location upstream of a boiler. The promoter can include a halide, a halogen, salts thereof, Br₂, HBr, and combinations thereof." which was not within the original disclosure.

Applicant is required to cancel the new matter in the reply to this Office Action.

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: Claims 2-20, the limitation "combusting a mixture of coal, and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof; *adding a particulate sorbent material comprising activeed carbon into the mercury containing gas; promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas to form a particulate promoted sorbent material*" (claim 2). The specifically does not disclose subsequently reacting the promoter, that is within the mercury-containing gas, with particulate sorbent material and subsequent claimed subject matter of

claims 3-5 which pertain the coal mixing with the promoter are not disclosed within the specification.

Claims 6-20 depend from claim 2. Claim 21, the limitation "combusting coal mixed with a promoter, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof to form the mercury-containing gas; *injecting a particulate sorbent material comprising activated carbon into the mercury-containing gas; promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas*". The specification does not disclose subsequently reacting the promoter that is within the mercury-containing gas, with particulate sorbent material.

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 2-21 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 written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for pre-AIA the inventor(s), at the time the application was filed, had possession of the claimed invention. Combusting a mixture of coal and a promoter is not present within the original specification (claim 2). Claims 3-20 depend on claim 2. Combusting coal, mixed with a promoter and wherein the coal and promoter are mixed at a location

upstream of a combustion furnace where combustion occurs is not within the original specification (claim 21).

Claims 2-21 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 does not enable combusting a mixture of coal and a promoter, adding a particulate sorbent material and promoting a least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas (claim 2). Claims 6-20 depend from claim 2. As well as the limitation of claim 21, "combusting coal mixed with a promoter, injecting a particulate sorbent material comprising activated carbon into the mercury containing gas, promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material".

The nature of the invention is unknown as it is not known how the promoter not have degraded to the point of being unusable after being subjected to the high temperature (~3500 °F) caused by the combustion of the coal.

To one having ordinary skill in the art it would follow that the promoter, after being subjected to such high temperatures of the coal combustion, would be degraded to the point of being not usable. It would not be obvious to one having ordinary skill in the art how the promoter would be capable of being reacted with the sorbent after being subjected to such high temperatures.

There is no direction provided by the inventor as the specification lacks antecedent basis for the claimed subject matter as specified above.

There are no existing working example as the specification lacks antecedent basis for the claimed subject matter as specified above.

The quantity of experimentation needed to use the invention based on the content of the disclosure is high as the specification lacks antecedent basis for the claimed subject matter as specified above.

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 AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
14/712,558	05/14/2015	1776	1600	4820.001US7	20	2

CONFIRMATION NO. 1934
CORRECTED FILING RECEIPT



0000000096827034

21186

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

Date Mailed: 01/23/2018

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

Inventor(s)

Edwin S. Olson, Grand Forks, ND;
Michael J. Holmes, Thompson, ND;
John Henry Pavlish, East Grand Forks, MN;

Applicant(s)

Midwest Energy Emissions Corp., Lewis Center, OH;

Power of Attorney: The patent practitioners associated with Customer Number 21186

Domestic Priority data as claimed by applicant

This application is a CON of 14/318,270 06/27/2014 PAT 9757689
which is a CON of 13/966,768 08/14/2013 PAT 8821819
which is a CON of 13/427,665 03/22/2012 PAT 8512655
which is a CON of 12/419,219 04/06/2009 PAT 8168147
which is a CON of 12/201,595 08/29/2008 ABN
which is a DIV of 11/209,163 08/22/2005 PAT 7435286
which claims benefit of 60/605,640 08/30/2004

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

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

If Required, Foreign Filing License Granted: 05/26/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/712,558**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
Title

SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Preliminary Class

423

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

page 2 of 4

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 Assets Control, 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.

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.116

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

In response to the Final Office Action dated December 6, 2017, please enter the following:

IN THE SPECIFICATION

Please amend the specification as follows:

The following paragraph, to follow paragraph [0013], is deleted:

~~In an embodiment, coal and promoter can be present as a mixture. The promoter and the coal can be mixed before combustion of the coal at a location upstream of a boiler. The promoter can include a halide, a halogen, salts thereof, Br₂, HBr, and combinations thereof.~~

IN THE CLAIMS

Please amend the claims as follows:

1. (Canceled)
2. (Previously Presented) A method for separating mercury from a mercury-containing gas, the method comprising:
 - combusting a mixture of coal and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof,
 - adding a particulate sorbent material comprising activated carbon into the mercury-containing gas;
 - promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material;
 - chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and
 - separating the mercury-sorbent particulate from the mercury-containing gas.
3. (Previously Presented) The method of claim 2, further comprising mixing the promoter and the coal before combusting the coal.
4. (Previously Presented) The method of claim 3, wherein the promoter mixed with the coal is in a liquid.
5. (Previously Presented) The method of claim 4, wherein the liquid is a hydrocarbon, a chlorinated hydrocarbon, supercritical carbon dioxide, water, salt solution, or a combination thereof.
6. (Previously Presented) The method of claim 2, wherein the particulate promoted sorbent material comprises active sites, wherein the active sites comprise halide anions bound to the activated carbon.

7. (Previously Presented) The method of claim 2, wherein the particulate promoted sorbent material comprises active sites, wherein the active sites comprise carbocations bound to halide anions.
8. (Previously Presented) The method of claim 2, wherein chemically reacting the sorbent material with the promoter in the mercury-containing gas comprises chemically reacting carbene species edge sites in the activated carbon with the promoter.
9. (Previously Presented) The method of claim 2, wherein carbocations in the activated carbon of the mercury-sorbent particulate accept electrons from mercury atoms of the mercury-sorbent particulate.
10. (Previously Presented) The method of claim 2, wherein the promoter is substantially in vapor form in the mercury-containing gas.
11. (Previously Presented) The method of claim 2, wherein the promoter is chosen from Cl_2 , HCl , sodium chloride, calcium chloride, and a combination thereof.
12. (Previously Presented) The method of claim 2, wherein the promoter is chosen from Br_2 , HBr , sodium bromide, calcium bromide, and a combination thereof.
13. (Previously Presented) The method of claim 2, wherein the promoter is chosen from PBr_3 , SCl_2 , and a combination thereof.
14. (Previously Presented) The method of claim 2, wherein the promoter is chosen from I_2 , HI , sodium iodide, calcium iodide, potassium iodide, and combinations thereof.
15. (Previously Presented) The method of claim 2, wherein the activated carbon is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

16. (Previously Presented) The method of claim 2, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

17. (Previously Presented) The method of claim 2, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

18. (Previously Presented) The method of claim 2, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

19. (Previously Presented) The method of claim 18, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

20. (Previously Presented) The method of claim 18, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

21. (Previously Presented) A method for separating mercury from a mercury-containing gas, the method comprising:

combusting coal mixed with a promoter, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof, to form the mercury-containing gas;

injecting a particulate sorbent material comprising activated carbon into the mercury-containing gas;

promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas, to form a particulate promoted sorbent material;

chemically reacting mercury in the mercury-containing gas with the promoted sorbent

material, to form a mercury-sorbent particulate; and
separating the mercury-sorbent particulate from the mercury-containing gas,
wherein the coal and promoter are mixed at a location upstream of a combustion furnace
where combustion occurs.

REMARKS

This responds to the Non-Final Office Action dated July 6, 2017.

No claims are presently amended. No claims are presently canceled. No new claims are presently added. As a result, claims 2-21 are now pending in this application.

Priority

I. The Office Action alleges that the subject matter of claims 2-20 are not supported in United States Provisional Patent Application No. 60/605,640 ("the '640 application) to which the instant application claims priority.

The Office Action alleges that the following are not supported in the '640 application:

- 1) combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof and subsequently reacting the promoter with particulate sorbent material (claim 2);
- 2) coal comprising a promoter (claims 3-5); and
- 3) adding a promoter to coal, wherein the promoter is chosen from Br₂, HBr, and combinations thereof; combusting the coal to form the mercury-containing gas and subsequently reacting the promoter with particulate sorbent material (claim 21).

See Office Action at page 3.

In the previous Response, Applicant provided annotated FIG. 2. Annotated FIG. 2 is taken from the '640 application and is marked to emphasize certain features of the FIG. Annotated FIG. 2 shows additives commensurate with the claimed promoters being added to coal upstream of the combustion zone. Annotated FIG. 2 is reproduced below.

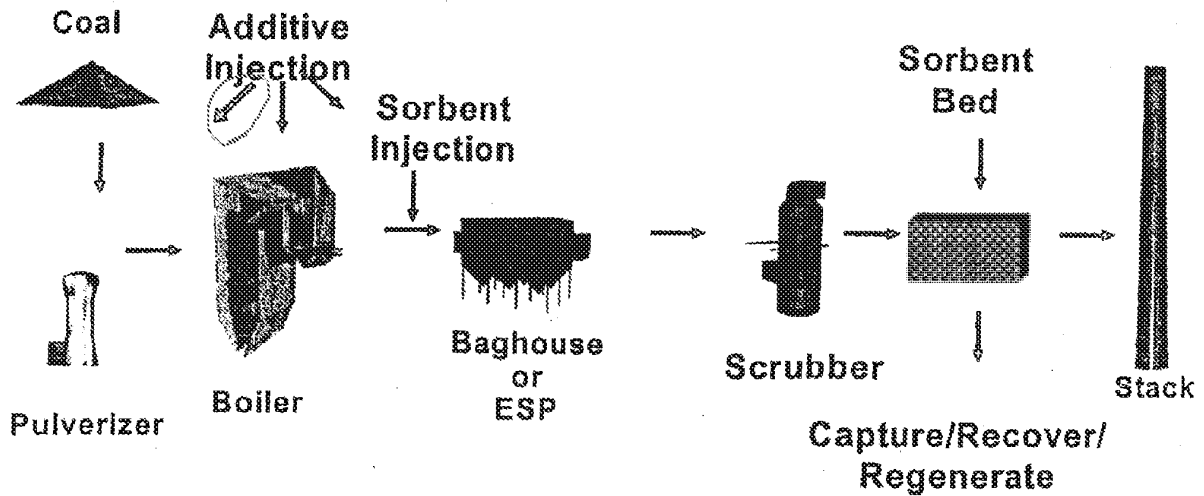


FIG. 2

Annotated FIG. 2

By not recognizing that the term “additive” encompasses the claimed promoter the Office Action selecting isolated text in the ‘640 application to limit the term as opposed to interpreting the term in view of the entire specification as would be understood by one of ordinary skill in the art. For example, at page 3, the Office Action refers to the Abstract of the ‘640 application and states that “additives are of base chemistry (Ca, Na, and others) and does not disclose that the additives are the promoters of the currently claimed invention.” The Office Action goes on to argue that the additives are limited to Group II elements citing Example 9 of the ‘640 application. However, when read in its entirety, the ‘640 application does not limit additives to Group I and II elements such as Ca and Na. For example, at Example 1, at page 2, additional promoting substances are mentioned. The ‘640 application goes on to state that those additional promoting substances can be added to the carbon (e.g., coal). Example 1E at page 3 identifies several halogens and hydrohalide species that are identified as the additional substance. Thus, the additional substances shown in FIG. 2 as an additive can include halogen or hydrohalide promoters.

More specifically, the provisional patent application at page 6, line 4 states that the invention includes a sorbent and a combination of additives to remove pollutants from the gas stream. At page

12, the '640 application states that "[t]he additive can be injected where desired (e.g., before, after, or within the boiler)." In examples where the additive is injected before the boiler, the additive is in contact with the coal shown in FIG. 2. Thus, the coal comprises the additive or promoter.

At the middle and bottom of page 3, the '640 application denotes that the "additives" can include those listed in Example 1E. Those additives include bromine, iodine, and hydrohalides. In discussing Example 1E, the Office Action acknowledges that these species include those recited in the claim. However, the apparent lack of any reference to FIG. 2 appears to prevent the Office Action from allowing the additives shown therein to apply to those of Example 1E. Example 1, 1E, and the others, though labeled as Examples, read very much like claims. It would be odd to reference a figure in the context that those Examples are written. Claim terms are given their broadest reasonable interpretation in light of the specification and drawings. There is no need to affirmatively refer to a figure to provide meaning to a claim term. Therefore, to associate text with a figure, it is not necessary to do so explicitly. This is particularly so in an instance such as this where FIG. 2 plainly shows an "additive" that one of ordinary skill can readily associate with an "additional substance".

Adding the halogen additives (promoters) to coal to be combusted and ultimately interact with the sorbent is contemplated in the '640 application. For example, page 11, first full paragraph mentions that the introduction of halogen to a carbon-air mixture has benefits over treating sorbents with halogens off-site at treatment facilities, such as "[t]here are no costs for transporting carbon and additive to a treatment facility..." and "[t]his process allows rapid on-site tailoring of additive-sorbent ratios in order to match the requirements of flue gas changes, such as needed when changing fuels or reducing loads, thus further optimizing the economics..." clearly referring to the halogen as the "additive". Further, page 10, last paragraph mentions that the additive can interact with the sorbent in-flight. Thus, the additive can be transported, e.g., via flue gas, to contact, and promote, the sorbent.

Finally, the Office Action further appears to argue that the additive cannot include a promoter because pages 13 and 14 mention that "the carbon sorbent is a promoted sorbent." *Office Action* at page 4. But, page 10 of the '640 application, summarizing the invention, describes treating the sorbent with "an optional second component." The '640 application goes on to state that the

optional second component can be a halogen. One of ordinary skill can easily associate the second component with the additive shown in FIG. 2.

In view of the foregoing, Applicant respectfully submits that adequate support for claims 2-20 is provided such as via the '640 application.

Specification

II. The Office Action rejects the previous amendment to the specification as allegedly lacking antecedent basis.

The Office Action rejects the previous amendment the specification. Although Applicant believes that support for the amendment includes that given in the '640 application, to expedite prosecution the paragraph following paragraph [0013] is deleted.

III. The Office Action objects to the specification as failing to provide antecedent basis for claims 2-20.

The Office Action states that there is not antecedent basis for "adding a particulate sorbent material comprising activated carbon into the mercury containing gas; promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas to form a particulate promoted sorbent material (Claim 2)." The statements made herein at I with respect to priority also show antecedent basis, such as via the '640 application. Claims 3-20 depend from claim 2 and possess antecedent basis for the reasons stated with respect to claim 2.

IV. The Office Action objects to the specification as failing to provide antecedent basis for claim 21.

The Office Action states that there is not antecedent basis for "injecting a particulate sorbent material comprising activated carbon into the mercury-containing gas; promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas (Claim 21)." Applicant respectfully refers to the statements made herein at I, with respect to priority, as providing antecedent basis such as via the '640 application.

The Rejections Under 35 U.S.C. 112, First Paragraph

V. The Office Action rejects claims 2-21 under 35 U.S.C. 112, first paragraph, as lacking written description.

The Office Action alleges that the subject matter of claims 2-21 was not present in the original specification. Applicant respectfully refers to the statements made herein at **I**, with respect to priority, as support for claims 2-21 such as via the '640 application.

VI. The Office Action rejects claims 2-21 under 35 U.S.C. 112, first paragraph, as lacking enablement.

The Office Action first states that "[t]he nature of the invention is unknown as it is not known how the promoter [would] not have degraded to the point of being unusable after being subjected to the high temperature (~3500 °F) caused by the combustion of the coal." To this point Applicant respectfully submits that even at these high temperatures the halogens themselves would not be degraded. Rather, they would be present in a gaseous state. In the gaseous state, the halogen promoters can interact with and promote the sorbent. A possible mechanism for the promotion of the sorbent is shown in FIG. 1 of the '640 application. The state of the halogen or halide, whether liquid or gas, does not impact its ability to carry out reactions described therein. One of ordinary skill in the art knowing the basic properties of these halides and halogens would know they are certainly usable after being subjected to the temperatures present in the boiler.

The Office Action further states that "[t]here is no direction provided by the inventor as the specification lacks antecedent basis for the claimed subject matter." The Office Action further states that because the specification allegedly lacks antecedent basis for the claimed subject matter, the "quantity of experimentation needed to use the invention...is high...." For the reasons stated herein at **I-IV**, the specification provides adequate antecedent basis for the claimed subject matter.

The Office Action further states, that there are no working examples of the disclosure. Applicant respectfully disagrees and refers to page 12 of the '640 application as read in conjunction with FIG. 2, which describes at least one example of the claimed method.

In discussing the direction provided by the inventor, the quantity of experimentation needed, and the working examples, the Office Action appears to be referring to the *Wands* factors. By not mentioning the balance of those factors the Office Action implies that the balance of the factors are

met. Those other factors include the breadth of the claims; the nature of the invention; the state of the prior art; the level of one of ordinary skill; the level of predictability in the art; and the quantity of experimentation needed to make of use the invention based on the content of the disclosure. *See* M.P.E.P. at 2161. With respect to the breadth of the claims, Applicant submits that the breadth is reasonable and the Office Action has indicated nothing to the contrary. With respect to the level of ordinary skill in the art, the Office Action has not insisted that any skill beyond that of one of ordinary skill in the art is required. With respect to the quantity of experimentation needed to use the invention, the Office Action has not asserted that any unreasonable level of experimentation would be required and Applicant believes that sufficient detail is laid forth to use the invention. With respect to the level of predictability in the art, the Office Action has not shown the art to be so unpredictable that one of ordinary skill could not understand the material set forth in the disclosure. With respect to the nature of the invention, the Office Action has not shown that the nature is so abstract that one of ordinary skill in the art could not understand the nature of the invention from the disclosure. With respect to the state of the prior art, the Office Action has not presented prior art disclosing the features of the claims. For the reasons stated herein the '640 application provides sufficient detail to satisfy those factors explicitly mentioned by the Office Action.

For the foregoing reasons, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 2-21 under 35 U.S.C. 112, first paragraph.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (651) 305-2704 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date January 23, 2018

By /Ryan J. Connell/

Ryan J. Connell
Reg. No. 74,611

Electronic Acknowledgement Receipt

EFS ID:	31584022
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Joseph P. Mehrle/April Smith
Filer Authorized By:	Joseph P. Mehrle
Attorney Docket Number:	4820.001US7
Receipt Date:	23-JAN-2018
Filing Date:	14-MAY-2015
Time Stamp:	17:04:21
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		4820001US7Amendment.pdf	237240 a75619e35f98ca8bc7c85f0b64f44cec7f606253	yes	14

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Transmittal Letter	1	1	
Response After Final Action	2	2	
Specification	3	3	
Claims	4	7	
Applicant Arguments/Remarks Made in an Amendment	8	14	

Warnings:

Information:

Total Files Size (in bytes):	237240

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: February 6, 2018

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop AF

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

X Amendment and Response under 37 C.F.R. § 1.116 (13 pgs.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: /Ryan J. Connell/

Ryan J. Connell

Reg. No. 74,611

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (j), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT	01/23/2018	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	x \$100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	x \$460 =	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	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE							

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

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

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

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

LIE
DIANE FLOYD

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.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	02/12/2018		
SCHWEGMAN LUNDBERG & WOESSNER, P.A. P.O. BOX 2938 MINNEAPOLIS, MINNESOTA 55402			EXAMINER ORLANDO, AMBER ROSE	
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			02/12/2018	ELECTRONIC

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

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

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

SLW@blackhillsip.com
uspto@slwip.com

DETAILED CORRESPONDENCE

Notice of Pre-AIA or AIA Status

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

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, 365(c), or 386(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosure of the prior-filed application, Application No. 14/318270, 13/966,768, 13/427,655, 12/419,219, 12/201,595, 11/209,163, 60/605,640 fails to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. Claims 2-20, combustng a mixture of coal and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, and combinations thereof and subsequently reacting the promoter with particulate sorbent material (claim 2) and subsequent claimed subject matter of claims 3-5 which pertain the coal comprising at promoter are not disclosed within the prior-filed application. Claims 6-20 depend from claim 2. Claim 21, the limitation "combusting coal mixed with a promoter" and subsequently reacting the promoter with particulate sorbent material are not disclosed within the prior-filed application.

The applicant has pointed to 60/605,640 that discloses the below figure:

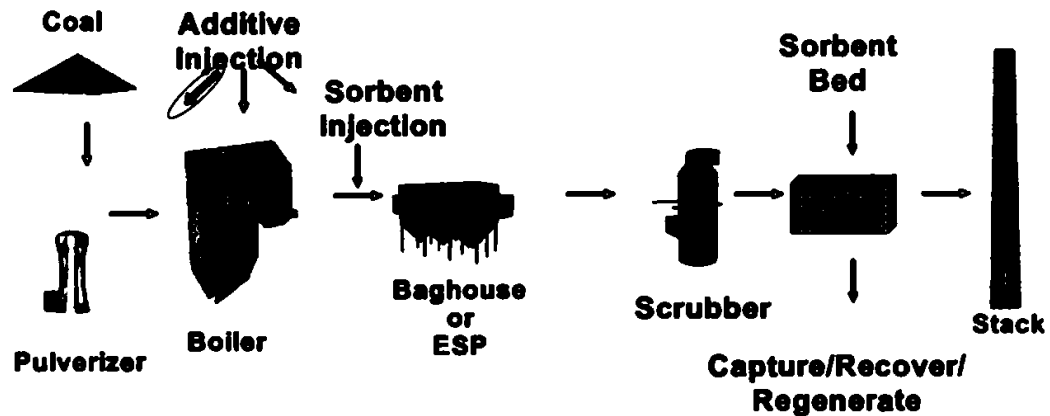


FIG. 2

Pointing to the left most arrow (circled above) and stating that the scope of the “additive of the ‘640 application is commensurate with that of the “promoter” in the instant application.

The examiner disagrees. The ‘640 specification mentions “additives” in the Abstract, Item 2 (page 3 of 17), item 9 (page 4 of 17), “Description of the Invention” (page 6 of 17).

The Abstract states that additives are of base chemistry (Ca, Na, and others) and does not disclose that the additives are the promoters of the currently claimed invention.

The applicant states that the ‘640 reference does not limit additives to Group I and Group II elements, pointing to Example 1 on page 2.

Examiner disagrees, Example 1 mentions “an additional promoting substance” but does not disclose what the promoting substance is nor does Example 1 equate “promoters” with “additives”.

The applicant points to page 6 line 4 and page 12 of the ‘640 application which disclose an additive, and an additive being injected before, after or within the boiler.

The applicant has not equated the additive with that of the promoter being claimed.

The applicant contends that page 3 of the '640 application denotes that the "additives", Example 1E discloses additives which include bromine, iodine and hydrohalides.

Item 2 teaches the "Same additives as 1E": referring to 1E which includes some of the promoters of the currently claimed invention. That being said none of the additives in Item 1E or 2 are being mixed with coal and no reference is made to figure 2 (i.e. the figure above) in either instance.

The provisional application does not "contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms, to enable an ordinarily skilled artisan to practice the invention claimed in the nonprovisional application."

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: Claims 2-20, the limitation "combusting a mixture of coal, and a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof; adding a particulate sorbent material comprising activated carbon into the mercury containing gas; promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas to form a particulate promoted sorbent material" (claim 2). The specification does not disclose subsequently reacting the promoter, that is within the mercury-containing gas, with particulate sorbent material and subsequent claimed subject matter of claims 3-5 which pertain the coal mixing with the promoter are not disclosed within the specification. Claims 6-20 depend from claim 2. Claim 21, the limitation "combusting coal mixed with a promoter, wherein the promoter is chosen from halides, halogens, salts thereof, and combinations thereof to form the mercury-containing gas; injecting a particulate sorbent material comprising activated carbon into the mercury-containing gas; promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in the mercury-containing gas". The specification does not

disclose subsequently reacting the promoter that is within the mercury-containing gas, with particulate sorbent material.

It appears that the applicant argues that the provisional application provides antecedent basis for the claimed subject matter.

The examiner disagrees. The Specification of the currently filed Nonprovisional application must include support for the claimed subject matter.

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 2-21 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 written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for pre-AIA the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not enable the claim limitations of claim 2, combusting coal, the coal comprising a promoter, to form the mercury-containing gas, wherein the promoter is chosen from halides, halogens and combinations thereof and subsequent claims 3-5 discloses the mixing of the promoters and the coal before combusting the coal.

Further claim 21, combusting coal mixed with a promoter, wherein the promoter is chosen from halides, halogens, salts thereof and combinations thereof to form the mercury containing gas.

Claims 6-20 depend on claim 2.

Response to Arguments

Applicant's arguments filed 01/23/2018 have been fully considered but they are not persuasive.

With regard to the applications priority, see response above.

The applicant contends that '640 provides antecedent basis for the claimed subject matter (claims 2-21).

The examiner disagrees. The current application itself, not the provisional, is required to have antecedent basis for the claimed subject matter.

The application contends that '640 provides support for the written description requirement.

The examiner disagrees. The current application itself, not the provisional, is required to have written description for the claimed subject matter.

Applicant's arguments, see pages 11-12, filed 01/23/2018, with respect to the rejection(s) of claim(s) 2-21 under 35 U.S.C. 112 have been fully considered and are persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

Advisory Action Before the Filing of an Appeal Brief	Application No. 14/712,558	Applicant(s) Olson et al.	
	Examiner AMBER R ORLANDO	Art Unit 1776	AIA Status No

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

THE REPLY FILED 23 January 2018 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☒ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:

a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.

b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires ____ months from the mailing date of the prior Advisory Action or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because

a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);

b) ☐ They raise the issue of new matter (see NOTE below);

c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____. (See 37CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. ☐ Applicants reply has overcome the following rejection(s): _____

6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. ☒ For purposes of appeal, the proposed amendment(s): (a) ☐ will not be entered, or (b) ☒ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

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

9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because:
 See attached Advisory Action for details.

13. ☐ Note the attached Information *Disclosure Statement(s)*. (PTO/SB/08) Paper No(s). _____

14. ☐ Other: _____

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: _____
 Claim(s) objected to: _____
 Claim(s) rejected: 2-21.
 Claim(s) withdrawn from consideration: _____

/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	

S/N 14/712.558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.116

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

In response to the Final Office Action dated December 6, 2017, please enter the following:

OK TO ENTER: /A.R.O/



UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Automated Interview Request (AIR)

Feb 21 2018

This paper requesting to schedule and/or conduct an interview is appropriate because:

This submission is requested to be accepted as an authorization for this interview to communicate via the internet. Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned concerning scheduling of the interview via video conference, instant messaging, or electronic mail, and to conduct the interview in accordance with office practice including video conferencing.

Name(s) :
Ryan Connell

S-signature:
/Ryan Connell/

Registration Number:
74611

U.S. Application Number:
14712558

Confirmation Number:
1934

E-mail Address:
rconnell@slwip.com

Phone Number:
6513052704

Proposed Time of Interview:
3-1-2018 10:00 AM ET

Preferred Interview Type:
Telephonic

I am the applicant or applicant's representative for this application.



UNITED STATES
PATENT AND TRADEMARK OFFICE

PALM-SILVER

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Applicant Initiated Examiner Interview Agenda

In the interview scheduled for 10:00 am EST on Thursday, February 27, the Applicant wishes to discuss, in part, the following points relating to the Advisory Action issued on February 12, 2018.

- Applicant would like to discuss the issues relating to priority.
- Applicant would like to further discuss possible amendments to the specification in view of the Advisory Action's statement that "[t]he current application itself, not the provisional, is required to have antecedent basis for the claimed subject matter."



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	03/05/2018		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MINNESOTA 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			03/05/2018	ELECTRONIC

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

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

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

SLW@blackhillsip.com
uspto@slwip.com

<i>Applicant-Initiated Interview Summary</i>	Application No. 14/712,558	Applicant(s) Olson et al.		
	Examiner AMBER R ORLANDO	Art Unit 1776	AIA (First Inventor to File) Status No	Page 1 of 2

All participants (applicant, applicants representative, PTO personnel):

1. AMBER R ORLANDO(Examiner); Telephonic 2. Ryan Connell(Attorney); Telephonic
3. Nicholas Lanzatella(Attorney); Telephonic

Date of Interview: 01 March 2018

Claims Discussed: Claim 2

Issues Discussed:

Item(s) under 35 U.S.C. 112:
The applicant proposed a CIP in order to overcome the 112 issues. The examiner agreed that a CIP including the limitations of the current claims would overcome the 112 issues.

Priority:
The examiner clarified that the priority issues still stand. The examiner also stated that the provisional application must contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise and exact terms, to enable an ordinarily skilled artisan to practice the invention claimed in the non provisional application.

Attachment(s): Agenda,

/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	

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

U.S. Patent and Trademark Office
PTOL-413/413b (Rev. 01/01/2015)

Interview Summary

Paper No. 20180301

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.

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL	<i>Application Number</i>	14/712,558
	<i>Filing Date</i>	May 14, 2015
	<i>First Named Inventor</i>	Edwin S. Olson
	<i>Confirmation Number</i>	1934
	<i>Group Art Unit</i>	1776
	<i>Examiner Name</i>	Amber Orlando
	<i>Attorney Docket Number</i>	4820.001US7
	<i>Customer No.</i>	21186

This is a Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application entitled
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

1. Submission required under 37 C.F.R. § 1.114:

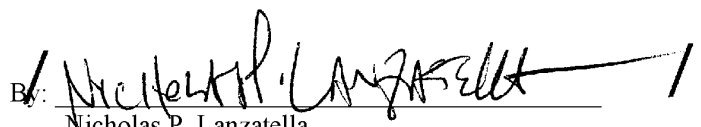
- ☒ Amendment and Response Under 37 C.F.R. § 1.116 (7 pages) is enclosed.
- ☒ Information Disclosure Statement (2 pages), Form 1449 (1 page), and copies of cited documents (7).
- ☒ Petition for Extension of Time (1 pg).

2. Fees

- ☒ Authorization to charge deposit account 19-0743 in the amount of \$1300.00 to pay the RCE filing fee required under 37 C.F.R. § 1.17(e).
- ☒ Authorization to charge deposit account 19-0743 in the amount of \$200.00 to pay the extension of time fee.

The Commissioner is hereby authorized to charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

By: 
 Nicholas P. Lanzatella
 Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.116

Mail Stop RCE

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

This response is filed with an RCE. In response to the Final Office Action dated December 6, 2017 and the Advisory Action dated February 12, 2018, please enter the following:

IN THE SPECIFICATION

Please amend the specification as follows:

The following paragraph, to follow paragraph [0013], is deleted:

~~In an embodiment, coal and promoter can be present as a mixture. The promoter and the coal can be mixed before combustion of the coal at a location upstream of a boiler. The promoter can include a halide, a halogen, salts thereof, Br₂, HBr, and combinations thereof.~~

IN THE CLAIMS

Please amend the claims as follows:

- 1-21. (Canceled)
22. (New) A method for reducing mercury in a mercury-containing gas to a desired level, the method comprising:
- injecting a sorbent into the mercury-containing gas;
 - collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas, wherein the sorbent is a promoted activated carbon that is promoted with at least one promoter that is a halogen, a halide, or a combination thereof, wherein the mercury-containing gas is a coal-combustion gas;
 - monitoring the mercury content of the cleaned gas; and
 - controlling, in response to the monitored mercury content of the cleaned gas, an injection rate of injecting the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.
23. (New) The method of claim 22, wherein the coal that is combusted comprises the promoter or a precursor thereof.
24. (New) The method of claim 23, further comprising combusting the coal that comprises the promoter or the precursor thereof.
25. (New) The method of claim 22, wherein the promoted activated carbon is promoted with the promoter while the promoter is in the gas phase or is a vapor.
26. (New) The method of claim 22, wherein the promoted activated carbon is promoted in-flight.
27. (New) The method of claim 22, further comprising promoting the activated carbon in-flight.

28. (New) The method of claim 22, wherein the promoted activated carbon comprises active sites, comprising halide anions bound to the activated carbon.

29. (New) The method of claim 22, wherein the promoted activated carbon comprises active sites comprising carbocations bound to halide anions.

30. (New) The method of claim 22, wherein collecting the mercury comprises chemically reacting carbene species edge sites in the activated carbon with the mercury.

31. (New) The method of claim 22, further comprising injecting an alkaline sorbent into the mercury-containing gas stream.

32. (New) The method of claim 31, wherein the alkaline sorbent is selected from the group consisting of alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

33. (New) The method of claim 31, wherein the alkaline sorbent is selected from the group consisting of sodium carbonate, calcium oxide, lime, and combinations thereof.

34. (New) The method of claim 22, wherein the activated carbon is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

35. (New) The method of claim 22, wherein the promoter is Br₂, HBr, Br⁻, sodium bromide, calcium bromide, or a combination thereof.

36. (New) The method of claim 22, wherein the promoter is HBr or Br⁻.

37. (New) The method of claim 22, wherein the promoter is HI or I⁻.

38. (New) The method of claim 22, wherein the mercury-containing gas is a flue gas stream downstream of a boiler furnace.

39. (New) The method of claim 22, wherein monitoring the mercury content of the cleaned gas is performed substantially continuously.

40. (New) The method of claim 22, wherein the sorbent has a composition comprising from about 1 to about 30 grams of promoter per 100 grains of activated carbon.

41. (New) The method of claim 22, further comprising injecting sorbent into the mercury-containing gas stream to form the promoted activated carbon.

REMARKS

This responds to the Final Office Action dated December 6, 2017 and the Advisory Action dated February 12, 2018.

No claims are presently amended. Claims 2-21 are presently canceled. Claims 22-41 are presently added. As a result, claims 22-41 are now pending in this application. Applicant notes that the pending claims are similar to the issued claims of U.S. patent no. 7,435,286.

In view of the cancelation of all prior claims, including all claims explicitly reciting application of the promoter or promoter precursor to the coal prior to combustion, Applicant believes the Final Office Action's and the Advisory Action's rejections and objections to the former claims no longer apply, including lack of priority, objections to the specification for failing to provide support, and written description rejections of the claims. Applicant therefore respectfully requests reconsideration and withdrawal of the all the objections and rejections in the Final Office Action and the Advisory Action.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (651) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date April 2, 2018

By Nicholas P. Lanzatella

Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

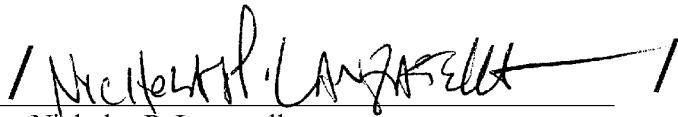
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date April 2, 2018

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:mlr1

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20080107579A1	5/8/2008	Downs, William, et al.
	US-20100024642A1	2/4/2010	Fukumoto, Kazuhiro, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2757309A1	10/28/2010	Olson, Edwin S, et al.	
	CA-2757309C	1/3/2017	Olson, Edwin S, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/449,112, Final Office Action mailed 02-15-18", 13 pgs	
	"Application Serial No. 15/449,112, Response filed 01-16-18 to Non Final Office Action mailed 09-27-17", 16 pgs	
	"Application Serial No. 15/589,359, Non Final Office Action mailed 02-21-18", 15 pgs	
	"Application Serial No. 15/589,359, Preliminary Amendment filed 01-03-18", 6 pgs	
	ZHU, JIANZHONG, et al., "Enhanced mercury ion adsorption by amine-modified activated carbon". Journal of hazardous materials 166, (2009), 866-872	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

PETITION FOR A ONE-MONTH EXTENSION OF TIME

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

In accordance with the provision of 37 C.F.R § 1.136(a), it is respectfully requested that a one-month extension of time be granted in which to respond to the Final Office Action mailed December 6, 2017, said period of response being extended from March 6, 2018 to April 6, 2018.

Please charge Deposit Account No. 19-0743 in the amount of \$200.00 to cover the required extension fee. Please charge any additional fees or credit overpayment to deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date April 2, 2018

By



Nicholas P. Lanzatella
Reg. No. 63,803

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Josef Louis Hoffmann/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 1 month with \$0 paid	1251	1	200	200
Miscellaneous:				
RCE- 1st Request	1801	1	1300	1300
Total in USD (\$)				1500

Electronic Acknowledgement Receipt	
EFS ID:	32224084
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Josef Louis Hoffmann/Megan Reed
Filer Authorized By:	Josef Louis Hoffmann
Attorney Docket Number:	4820.001US7
Receipt Date:	02-APR-2018
Filing Date:	14-MAY-2015
Time Stamp:	17:03:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 1500
RAM confirmation Number	040318INTEFSW00003882190743
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		signed_4820_001US7AAResponse.pdf	201489	yes	12
			e3811617bdac6877c65d0b84d7bee1d0cae12514a		
	Multipart Description/PDF files in .zip description				
	Document Description		Start		End
	Request for Continued Examination (RCE)		1		1
	Response After Final Action		2		2
	Specification		3		3
	Claims		4		6
	Applicant Arguments/Remarks Made in an Amendment		7		8
	Transmittal Letter		9		10
	Information Disclosure Statement (IDS) Form (SB08)		11		11
	Extension of Time		12		12
Warnings:					
Information:					
2	Foreign Reference	CA2757309A1.pdf	2176673	no	40
			75a8fc2d98460187fb2d93754aa7f36a4a679489		
Warnings:					
Information:					
3	Foreign Reference	CA2757309C.pdf	2285367	no	46
			1da7414f16f7b9fdc8e8ce879649a87b9289d1bf		
Warnings:					
Information:					

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		signed_4820_001US7AAResponse.pdf	201489	yes	12
			e3811617bdac6877c65d0b84d7bee1d0ca12514a		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Request for Continued Examination (RCE)	1	1
	Response After Final Action	2	2
	Specification	3	3
	Claims	4	6
	Applicant Arguments/Remarks Made in an Amendment	7	8
	Transmittal Letter	9	10
	Information Disclosure Statement (IDS) Form (SB08)	11	11
	Extension of Time	12	12

Warnings:

Information:

2	Foreign Reference	CA2757309A1.pdf	2176673	no	40
			75a8fc2d98460187fb2d93754aa7f36a4a679489		

Warnings:

Information:

3	Foreign Reference	CA2757309C.pdf	2285367	no	46
			1da7414f16f7b9fcdc8e8ce879649a87b9289d1bf		

Warnings:

Information:

4	Non Patent Literature	Zhu_Enhanced.pdf	1000306	no	7
			25ff7d89d96e2ef3f352968ce41093df7cc8ddf9		
Warnings:					
Information:					
5	Non Patent Literature	4820003US2_PAMD_01_03_18.pdf	55143	no	6
			c7ab10bdc2aa55901fae60add6bfff2c7881cc7b9a		
Warnings:					
Information:					
6	Non Patent Literature	4820005US1_AARN_01_16_18.pdf	129915	no	16
			e0dd972f2f2ac807426ed94b3ebe55fd41534241		
Warnings:					
Information:					
7	Non Patent Literature	IDS4820003US2_OARN_02_21_18.pdf	748583	no	15
			5894ecb83993fd5c51cec151ecf5ce8816764465		
Warnings:					
Information:					
8	Non Patent Literature	IDS4820005US1_FOAR_02_15_18.pdf	672932	no	13
			a8efdd6c5c92391eda943f74378e19b66d7b9938		
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	32274	no	2
			830f96cc94c9a79f3cc199e2c71263649df2201d		
Warnings:					
Information:					
Total Files Size (in bytes):			7302682		

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.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (l), 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(j))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	04/02/2018	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(j))	* 20	Minus	** 20 = 0	x \$100 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3 = 0	x \$460 =	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(j))	*	Minus	** =	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	*** =	X \$ =
	☐ Application Size Fee (37 CFR 1.16(s))				
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				
					TOTAL ADD'L FEE

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

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

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

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

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.

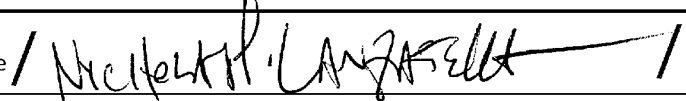
LIE
VERONICA DAY EVERETT

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

First Named Inventor:	Edwin S. Olson	Nonprovisional Application Number (if known):	14/712,558
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	Docket No.:	4820.001US7

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. **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 	Date May 8, 2018
Name (Print/Typed) Nicholas P. Lanzatella	Practitioner Registration Number: 63,803
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, see below*.	
*Total of <u>1</u> forms are submitted.	

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Jose M. Nunez/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
REQUEST FOR PRIORITIZED EXAMINATION	1817	1	4000	4000
Pages:				
Claims:				
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				4140

Electronic Acknowledgement Receipt

EFS ID:	32567850
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Jose M. Nunez/Megan Reed
Filer Authorized By:	Jose M. Nunez
Attorney Docket Number:	4820.001US7
Receipt Date:	08-MAY-2018
Filing Date:	14-MAY-2015
Time Stamp:	16:42:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 4140
RAM confirmation Number	050918INTEFSW00003965190743
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		SIGNED_4820_001US7_PriorExam.pdf	167794 72cd753f546e58c2d1ae67029be88034e93f1993	yes	2
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	1	
	TrackOne Request		2	2	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32105 60f7530e153debcd3f54d4f3391b9763182ee859	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			199899		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7
Filed: May 14, 2015
Examiner: Amber Orlando
Customer No.: 21186

Serial No.: 14/712,558
Due Date: N/A
Group Art Unit: 1776
Confirmation No.: 1934

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

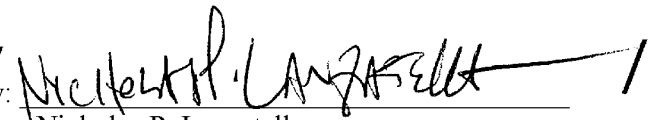
We are transmitting herewith the following attached items (as indicated with an "X"):

X Certification and Request for Prioritized Examination (Track 1) (1 pg), including authorization to charge Deposit Account 19-0743 in the amount of \$4000.00 for the Prioritized Examination (Track 1) filing fee as set forth in 37 C.F.R. § 1.17(c); and Authorization to charge Deposit Account 19-0743 for the Processing Fee (Track 1) set forth in 37 C.F.R. § 1.17(i) in the amount of \$140.00.

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Edwin S. Olson et al.	Examiner:	AMBER ROSE ORLANDO
Serial No.:	14/712,558	Group Art Unit:	1776
Filed:	May 14, 2015	Docket No.:	4820.001US7
Customer No.:	21186	Confirmation No.:	1934
Title:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

SUPPLEMENTAL AMENDMENT

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

Please enter the following amendments:

IN THE CLAIMS

1-21. (Canceled)

22. (Currently Amended) A method for reducing mercury in a mercury-containing gas ~~to a desired level~~, the method comprising:

injecting a sorbent into the mercury-containing gas;

collecting ~~greater than 70 wt% of the~~ mercury in the mercury-containing gas on the sorbent to produce a cleaned gas, wherein the sorbent is a promoted activated carbon that is promoted in-flight with at least one promoter that is ~~a halogen, a halide, Br₂, HBr, Br⁻~~, or a combination thereof, wherein the mercury-containing gas is a coal-combustion gas;

~~monitoring the mercury content of the cleaned gas; and~~

~~controlling, in response to the monitored mercury content of the cleaned gas, an injection rate of injecting the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.~~

23. (Previously Presented) The method of claim 22, wherein the coal that is combusted comprises the promoter or a precursor thereof.

24. (Previously Presented) The method of claim 23, further comprising combusting the coal that comprises the promoter or the precursor thereof.

25. (Previously Presented) The method of claim 22, wherein the promoted activated carbon is promoted with the promoter while the promoter is in the gas phase or is a vapor.

26. (Canceled)

27. (Previously Presented) The method of claim 22, further comprising promoting the activated carbon in-flight.

28. (Previously Presented) The method of claim 22, wherein the promoted activated carbon comprises active sites, comprising halide anions bound to the activated carbon.

29. (Previously Presented) The method of claim 22, wherein the promoted activated carbon comprises active sites comprising carbocations bound to halide anions.

30. (Previously Presented) The method of claim 22, wherein collecting the mercury comprises chemically reacting carbene species edge sites in the activated carbon with the mercury.

31. (Previously Presented) The method of claim 22, further comprising injecting an alkaline sorbent into the mercury-containing gas stream.

32. (Previously Presented) The method of claim 31, wherein the alkaline sorbent is selected from the group consisting of alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

33. (Previously Presented) The method of claim 31, wherein the alkaline sorbent is selected from the group consisting of sodium carbonate, calcium oxide, lime, and combinations thereof.

34. (Previously Presented) The method of claim 22, wherein the activated carbon is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

35. (Canceled)

36. (Previously Presented) The method of claim 22, wherein the promoter is HBr or Br⁻.

37. (Canceled)

38. (Previously Presented) The method of claim 22, wherein the mercury-containing gas is a flue gas stream downstream of a boiler furnace.

39. (Previously Presented) The method of claim 22, wherein monitoring the mercury content of the cleaned gas is performed substantially continuously.

40. (Previously Presented) The method of claim 22, wherein the sorbent has a composition comprising from about 1 to about 30 grams of promoter per 100 grains of activated carbon.
41. (Previously Presented) The method of claim 22, further comprising injecting sorbent into the mercury-containing gas stream to form the promoted activated carbon.
42. (New) The method of claim 22, comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas.
43. (New) The method of claim 22, comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas on the sorbent.
44. (New) The method of claim 22, wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising:
monitoring the mercury content of the cleaned gas; and
controlling, in response to the monitored mercury content of the cleaned gas, an injection rate of injecting the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.

PRELIMINARY AMENDMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 6

Docket No: 4820.001US7

REMARKS

Claim 22 is amended, claims 26, 35, and 37 are canceled, and claims 42-45 are added; as a result, claims 22-25, 27-34, 36, and 38-44 are now pending in this application.

Claim 22 is amended to move some features to new dependent claims 42-44, and to incorporate features from canceled dependent claims 26 and 35.

No new matter is added via the amendments or new claims herein.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 349-9580 to facilitate prosecution of this application.

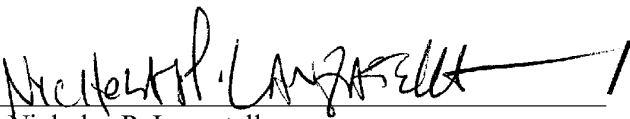
If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully Submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date May 15, 2018

By



Nicholas P. Lanzatella

Reg. No. 63,803

Electronic Acknowledgement Receipt

EFS ID:	32628469
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Jose M. Nunez/Megan Reed
Filer Authorized By:	Jose M. Nunez
Attorney Docket Number:	4820.001US7
Receipt Date:	15-MAY-2018
Filing Date:	14-MAY-2015
Time Stamp:	14:40:42
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		SIGNED_4820_001US7_Amend ment.pdf	114915 13b536e4f8aaf7ddc4d34da5a53960f56f0855c8	yes	7

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Transmittal Letter	1	1	
Supplemental Response or Supplemental Amendment	2	2	
Claims	3	6	
Applicant Arguments/Remarks Made in an Amendment	7	7	
Warnings:			
Information:			
Total Files Size (in bytes):		114915	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

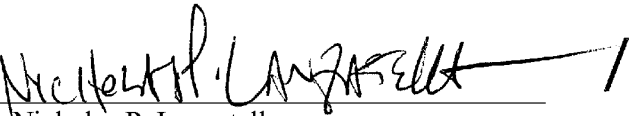
X Supplemental Amendment (6 pgs.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By:



Nicholas P. Lanzatella

Reg. No. 63,803

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 15/449,112, Advisory Action mailed 04-24-18", 3 pgs			
	"Application Serial No. 15/449,112, Response filed 02-15-18 to Final Office Action mailed 02-15-18", 13 pgs.			
	"Application Serial No. 15/449,112, Response filed 04-06-18 to Final Office Action mailed 02-15-18", 13 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	32649299
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Jordan Rivard Golomb/Jamie Johnson
Filer Authorized By:	Jordan Rivard Golomb
Attorney Docket Number:	4820.001US7
Receipt Date:	17-MAY-2018
Filing Date:	14-MAY-2015
Time Stamp:	11:27:42
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		14712558_SIDS_5-17-2018.pdf	259909	yes	5
			1caf8265a489bec5e8f68257987dc2cf01be88c2		

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Miscellaneous Incoming Letter		1	1	
	Miscellaneous Incoming Letter		2	2	
	Transmittal Letter		3	4	
	Information Disclosure Statement (IDS) Form (SB08)		5	5	
Warnings:					
Information:					
2	Non Patent Literature	4820005US1_AARF_04-06-18.pdf	167589	no	13
			8259df99da69c32418539f927a3e4b470dac3bd0		
Warnings:					
Information:					
3	Non Patent Literature	4820005US1_AARF_05-14-18.pdf	167723	no	13
			95b083194ec0ab8f196b0b209d386833caa439ea		
Warnings:					
Information:					
4	Non Patent Literature	4820005US1_ADAR_04242018.pdf	392827	no	3
			458ceba07832feb42cfbf59bda4a97429e8c041c		
Warnings:					
Information:					
Total Files Size (in bytes):			988048		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

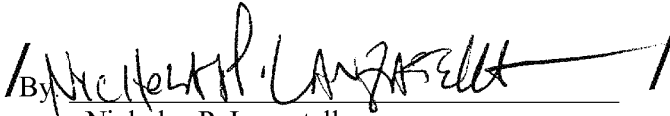
X Communication Concerning Prior and Copending Applications (1 pg.)

X Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (3).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By 

Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPENDING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

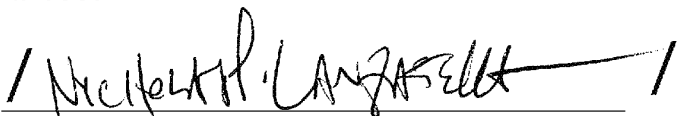
<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
15/951,970	April 12, 2018	4820.001US8	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/974,343	May 8, 2018	4820.001US9	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/978,760	May 14, 2018	4820.007US4	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/853,029	December 22, 2017	4820.018US1	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 5-16-2018

By



Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed after filing of the application or after the filing of the most recent RCE, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 19-0743 in order to have this Information Disclosure Statement considered.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

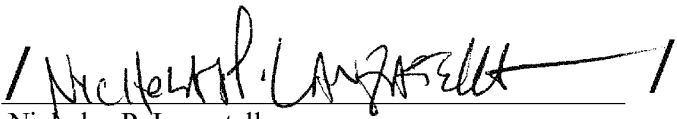
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 5-16-2018

By



Nicholas P. Lanzatella
Reg. No. 63,803

NPL:jj



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186 7590 05/23/2018 SCHWEGMAN LUNDBERG & WOESSNER, P.A. P.O. BOX 2938 MINNEAPOLIS, MINNESOTA 55402 UNITED STATES OF AMERICA			EXAMINER	
			ART UNIT	PAPER NUMBER
			MAIL DATE	DELIVERY MODE
			05/23/2018	

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

Notice of Pre-AIA or AIA Status

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

DETAILED ACTION

Election/Restriction

Newly submitted claims 22-41 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Species I: Original claims 2-21 directed to a method for separating mercury including combusting a mixture of coal and a promoter, adding a particulate sorbent, promoting at least a portion of the sorbent material, chemically reacting mercury in the mercury containing gas with the promoted sorbent material to form a mercury sorbent particulate and separating the mercury-sorbent particulate from the mercury-containing gas. Claims 2-21 do not disclose collecting greater than 70 wt% of the mercury or controlling the injection of the sorbent in response to the monitored mercury content.

Species II: Currently presented Claims 22-41 directed to a method for reducing mercury in a mercury containing gas, injecting a sorbent, collecting greater than 70 wt% of the mercury in the mercury containing gas, monitoring the mercury content of the cleaned gas, and controlling in response to the monitored mercury content of the cleaned gas an injection rate of injecting the sorbent into the mercury-containing gas. Claims 22-41 do not include combusting the mixture of coal and a promoter, and the step of promoting the sorbent material.

The species are independent or distinct because each of the species contains separate and distinct limitations as described above. In addition, these species are not obvious variants of each other based on the current record.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits.

Accordingly, claims 22-41 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

Application/Control Number: 14/712,558
Art Unit: 1776

Page 4

/AMBER ROSE ORLANDO/
Primary Examiner, Art Unit 1776

***Notice of Non-Compliant
Amendment (37 CFR 1.121)***

Application No.

14/712,558

Applicant(s)

Olson et al.

Examiner

AMBER R ORLANDO

Art Unit

1776

AIA Status

No

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

The amendment document filed on 04/04/2018 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

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

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

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

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period if the non-compliant amendment is an** after-final amendment or an amendment filed after allowance. If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.
2. Applicant is given **two months** from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a *Quayle* action. If any of above boxes 1. to 4. are checked, the correction required is only the **corrected section** of the non-compliant amendment in compliance with 37 CFR 1.121.

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

Failure to timely respond to this notice will result in:

Abandonment of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or

Non-entry of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

/AMBER ROSE ORLANDO/
Primary Examiner, Art Unit 1776

U.S. Patent and Trademark Office
PTOL-324 (11-13)

Notice of Non-Compliant Amendment (37 CFR 1.121)

Part of Paper No. 20180514

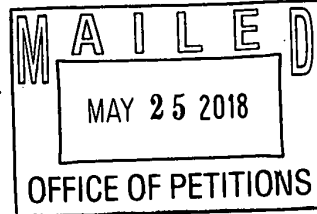
Continuation of 4(e) Other: See attached Informal or Non-Responsive Amendment after Examiner Action

.



UNITED STATES PATENT AND TRADEMARK OFFICE

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS MN MINNESOTA 55402



United States
Commissioner for Patents
Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Doc Code: TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 14/712,558
1. THE REQUEST FILED <u>May 8, 2018</u> 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). C. 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 <u>petition for extension of time</u> to extend the time period for filing a reply; B. filing an <u>amendment to amend the application to contain more than four independent claims, more than thirty total claims</u>, or a multiple dependent claim; C. filing a <u>request for continued examination</u>; 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 Brian W. Brown at 571-272-5338. /Brian W. Brown/ [Signature] Petitions Examiner, Office of Petitions (Title)	

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL AMENDMENT

MS Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Please enter the following amendments:

IN THE CLAIMS

1-44. (Canceled)

45. (New) A method for separating mercury from a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁻, or a combination thereof;

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas;

promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in-flight, to form a particulate promoted sorbent material;

chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and

separating the mercury-sorbent particulate from the mercury-containing gas.

46. (New) The method of claim 45, wherein the pyrolysis char is a promoted pyrolysis char that is promoted by the promoter.

47. (New) The method of claim 45, wherein promoting at least a portion of the sorbent by chemically reacting the sorbent material with the promoter in-flight is performed at least partially in the mercury-containing gas.

48. (New) The method of claim 45, wherein the pyrolysis char and the promoter are added prior to the combustor, within the combustor, or a combination thereof.

49. (New) The method of claim 45, wherein the pyrolysis char and the promoter are added within the combustor.

50. (New) The method of claim 45, further comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas.

51. (New) The method of claim 45, further comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas on the promoted sorbent to produce a cleaned gas.

52. (New) The method of claim 45, wherein the promoted sorbent has a composition comprising from about 1 to about 30 grams of promoter per 100 grains of activated carbon.

53. (New) The method of claim 45, wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising:

monitoring the mercury content of the cleaned gas; and

controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.

54. (New) The method of claim 45, wherein the promoter that reacts with the sorbent material to form the particulate promoted sorbent material is Br_2 , HBr , Br^- , or a combination thereof.

55. (New) The method of claim 45, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

56. (New) The method of claim 45, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

57. (New) The method of claim 45, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a mercury-stabilizing reagent chosen from S, Se, H_2S , SO_2 , H_2Se , SeO_2 , CS_2 , P_2S_5 , and combinations thereof.

58. (New) The method of claim 45, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

59. (New) The method of claim 58, wherein the secondary component is chosen from halogens, halide salts, HI , HBr , HCl , and combinations thereof.

60. (New) The method of claim 58, wherein the secondary component is chosen from I_2 , HI, and combinations thereof.

61. (New) A method for separating mercury from a mercury-containing gas, the method comprising:

combusting coal in a combustor comprising pyrolysis char and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br_2 , HBr, Br^- , or a combination thereof;

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas;

promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in-flight, to form a particulate promoted sorbent material;

chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and

separating the mercury-sorbent particulate from the mercury-containing gas.

62. (New) The method of claim 61, wherein the pyrolysis char is a promoted pyrolysis char that has been promoted by the promoter, and wherein promoting at least a portion of the sorbent by chemically reacting the sorbent material with the promoter in-flight is performed at least partially in the mercury-containing gas.

63. (New) A method for separating mercury from a mercury-containing gas, the method

comprising:

combusting coal in a combustor and adding within the combustor an in-flight promoted pyrolysis char promoted by a promoter, to form the mercury-containing gas, wherein the promoter comprises Br_2 , HBr , Br^- , or a combination thereof;

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas;

promoting at least a portion of the sorbent material by chemically reacting the sorbent material with the promoter in-flight, to form a particulate promoted sorbent material;

chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate; and

separating the mercury-sorbent particulate from the mercury-containing gas.

64. (New) The method of claim 63, wherein promoting at least a portion of the sorbent by chemically reacting the sorbent material with the promoter in-flight is performed at least partially in the mercury-containing gas.

65. (New) A method for separating mercury from a mercury-containing gas, the method comprising:

- combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br_2 , HBr , Br^- , or a combination thereof;
- adding a sorbent material comprising activated carbon into the mercury-containing gas;
- promoting at least a portion of the sorbent material by reacting the sorbent material with the promoter in-flight, to form a promoted sorbent material;
- reacting mercury in the mercury-containing gas with the promoted sorbent material; and
- separating the promoted sorbent with the reacted mercury from the mercury-containing gas.

REMARKS

This is in response to the notice of non-compliant amendment mailed May 23, 2018. No claims are amended, claims 22-44 are canceled, claims 1-21 were previously canceled, and claims 45 to 65 are added; as a result, claims 45-65 are now pending in this application.

Claims 45 to 65 are similar to claims 2-21, with a difference that instead of reciting combustion of coal mixed with a promoter, the claims recite combustion of coal in a combustor that includes pyrolysis char and a promoter (claims 45 and 65), injecting the pyrolysis char and promoter within the combustor (claim 61), or injecting an in-flight promoted pyrolysis into the combustor (claim 63). Independent claims 45, 61, and 63 also recite that the promoter comprises "...Br₂, HBr, Br⁻, or a combination thereof...", a slightly a narrower range of promoters than prior claim 2's "...halides, halogens, salts thereof, and combinations thereof..." Examples of support for the new claims are given in the following table, with citations referring to the present published US application. No new matter is added via the new claims herein.

Claim #, feature	Example of support
45, combustng a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas	[0006] combustng coal to form the mercury-containing gas [0119] the halogen/halide promoted sorbent can be added where desired, "e.g., before, after, or within the boiler." [0049] the activated carbon can be pyrolysis char [0073] and [0093] a promoted sorbent can include the promoter
45, wherein the promoter comprises Br ₂ , HBr, Br ⁻ , or a combination thereof	[0066] Br ₂ [0066] and [0067] HBr [0073] halide ions such as Br ⁻

45, adding a particulate sorbent material comprising activated carbon into the mercury-containing gas	[0056], [0057], and FIG. 3, activated carbon reservoir 110 connects via transport lines 111 and 115 to injection point 116. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”
45, promoting at least a portion of the sorbent material by chemically reacting the sorbent material in-flight, to form a particulate promoted sorbent material	[0062] promotion can be “in-flight” [0077] and [0078] “in-flight” promotion can be contact between the vapors of the promoter with the carbon particles at the coal-combustion site, which can be distributed in a transport stream or other gas stream. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”
45, chemically reacting mercury in the mercury-containing gas with the promoted sorbent material, to form a mercury-sorbent particulate	[0072] promoted sorbent has high reactivity with mercury.
45, separating the mercury-sorbent particulate from the mercury-containing gas	[0059] the system can include a particulate separator.
46, wherein the pyrolysis char is a promoted pyrolysis char that is promoted by the promoter	[0049] the activated carbon can be pyrolysis char [0073] and [0093] a promoted sorbent can include the promoter
47, wherein promoting at least a portion of the sorbent by chemically reacting the sorbent material with the promoter in-flight is performed at least partially in the mercury-	[0077] and [0078] “in-flight” promotion can be contact between the vapors of the promoter with the carbon particles at the coal-combustion site, which can be distributed in a

containing gas	transport stream or other gas stream. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”
48, wherein the pyrolysis char and the promoter are added prior to the combustor, within the combustor, or a combination thereof	[0119] the halogen/halide promoted sorbent can be added where desired, “e.g., before, after, or within the boiler.”
49, wherein the pyrolysis char and the promoter are added within the combustor	[0119] the halogen/halide promoted sorbent can be added where desired, “e.g., before, after, or within the boiler.”
50, further comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas	[0022]
51, further comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas on the promoted sorbent to produce a cleaned gas	[0022]
52, wherein the promoted sorbent has a composition comprising from about 1 to about 30 grams of promoter per 100 grains of activated carbon	[0027]
53, wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising: monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the	[0022] monitoring, controlling rate of addition of sorbent [0027] monitoring, controlling composition of sobent [0061] maintaining mercury concentration within desired limits such as via adjustment of flow controllers

mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level	
54, wherein the promoter that reacts with the sorbent material to form the particulate promoted sorbent material is Br ₂ , HBr, Br ⁻ , or a combination thereof	[0066] Br ₂ [0066] and [0067] HBr [0073] halide ions such as Br ⁻
55, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof	[0013]
56, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof	[0026]
57, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a mercury-stabilizing reagent chosen from S, Se, H ₂ S, SO ₂ , H ₂ Se, SeO ₂ , CS ₂ , P ₂ S ₅ , and combinations thereof	[0025]
58, further comprising contacting at least one of the sorbent material and the promoted sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof	[0014], [0016], and [0017]
59, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof	[0014], [0017]
60, wherein the secondary component is	[0014], [0017]

chosen from I ₂ , HI, and combinations thereof	
61, like claim 45, but reciting “combusting coal in a combustor comprising pyrolysis char and a promoter”	[0119] the halogen/halide promoted sorbent can be added where desired, “e.g., before, after, or within the boiler.” [0049] the activated carbon can be pyrolysis char [0073] and [0093] a promoted sorbent can include the promoter
62, wherein the pyrolysis char is a promoted pyrolysis char that has been promoted by the promoter, and wherein promoting at least a portion of the sorbent by chemically reacting the sorbent material with the promoter in-flight is performed at least partially in the mercury-containing gas	[0049] the activated carbon can be pyrolysis char [0073] and [0093] a promoted sorbent can include the promoter [0077] and [0078] “in-flight” promotion can be contact between the vapors of the promoter with the carbon particles at the coal-combustion site, which can be distributed in a transport stream or other gas stream. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”
63, like claim 45, but reciting “combusting coal in a combustor and adding within the combustor an in-flight promoted pyrolysis char promoted by a promoter”	[0119] the halogen/halide promoted sorbent can be added where desired, “e.g., before, after, or within the boiler.” [0049] the activated carbon can be pyrolysis char [0073] and [0093] a promoted sorbent can include the promoter [0062] promotion can be “in-flight” [0077] and [0078] “in-flight” promotion can be contact between the vapors of the promoter with the carbon particles at the coal-

	combustion site, which can be distributed in a transport stream or other gas stream
64, wherein promoting at least a portion of the sorbent by chemically reacting the sorbent material with the promoter in-flight is performed at least partially in the mercury-containing gas	[0077] and [0078] “in-flight” promotion can be contact between the vapors of the promoter with the carbon particles at the coal-combustion site, which can be distributed in a transport stream or other gas stream. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”
65, combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas	[0006] combusting coal to form the mercury-containing gas [0119] the halogen/halide promoted sorbent can be added where desired, “e.g., before, after, or within the boiler.” [0049] the activated carbon can be pyrolysis char [0073] and [0093] a promoted sorbent can include the promoter
65, wherein the promoter comprises Br ₂ , HBr, Br ⁻ , or a combination thereof	[0066] Br ₂ [0066] and [0067] HBr [0073] halide ions such as Br ⁻
65, adding a sorbent material comprising activated carbon into the mercury-containing gas	[0056], [0057], and FIG. 3, activated carbon reservoir 110 connects via transport lines 111 and 115 to injection point 116. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”

SUPPLEMENTAL AMENDMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 14

Docket No: 4820.001US7

65, promoting at least a portion of the sorbent material by reacting the sorbent material in-flight, to form a particulate promoted sorbent material	[0062] promotion can be “in-flight” [0077] and [0078] “in-flight” promotion can be contact between the vapors of the promoter with the carbon particles at the coal-combustion site, which can be distributed in a transport stream or other gas stream. [0058] “For clarity, single injection points 116 or 119 are shown in FIG. 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.”
65, reacting mercury in the mercury-containing gas with the promoted sorbent material	[0072] promoted sorbent has high reactivity with mercury.
65, separating the promoted sorbent with the reacted mercury from the mercury-containing gas	[0059] the system can include a particulate separator.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 349-9580 to facilitate prosecution of this application.

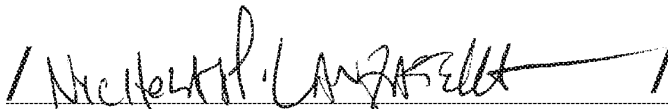
If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully Submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date June 13, 2018

By


Nicholas P. Lanzatella
Reg. No. 63,803

Electronic Acknowledgement Receipt

EFS ID:	32890663
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	John I. Fischer/Allison Johnson
Filer Authorized By:	John I. Fischer
Attorney Docket Number:	4820.001US7
Receipt Date:	13-JUN-2018
Filing Date:	14-MAY-2015
Time Stamp:	17:16:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		4820_001US7_SuppAmd-signed.pdf	153148	yes	16
			a673eccd97b685315b287c4c145a1918cab1c99b		

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Transmittal Letter	1	1	
Supplemental Response or Supplemental Amendment	2	2	
Claims	3	8	
Applicant Arguments/Remarks Made in an Amendment	9	16	
Warnings:			
Information:			
Total Files Size (in bytes):		153148	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

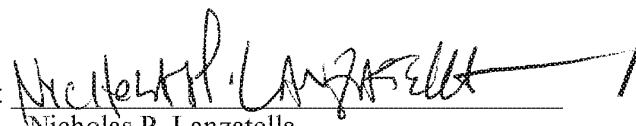
We are transmitting herewith the following attached items (as indicated with an "X"):

X Supplemental Amendment (15 pgs.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20090297413A1	12/3/2009	Olson, Edwin S, et al.
	US-20180133646A1	5/17/2018	Pavlish, John H, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15//974,343 Preliminary Amendment Filed 5-15-2018", 7 pgs.		
	"Application Serial No. 15//978,760, Preliminary Amendment Filed 5-15-2018", 7 pgs.		
	"Application Serial No. 15/295,594, Restriction Requirement mailed 05-22-18", 6 pgs		
	"Application Serial No. 15/295,594, Supplemental Amendment Filed 5-15-2018", 10 pgs.		
	"Application Serial No. 15/589,359, Final Office Action mailed 06-04-18", 13 pgs		
	"Application Serial No. 15/589,359, Response filed 05-18-18 to Non Final Office Action mailed 02-21-18", 14 pgs.		

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	32963653
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Jordan Rivard Golomb/Jamie Johnson
Filer Authorized By:	Jordan Rivard Golomb
Attorney Docket Number:	4820.001US7
Receipt Date:	21-JUN-2018
Filing Date:	14-MAY-2015
Time Stamp:	13:39:44
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		14712558_SIDS_6-21-2018.pdf	266954	yes	6
			1a6551813a0768f9f288a19e108b966645c23592		

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Miscellaneous Incoming Letter		1	1	
	Miscellaneous Incoming Letter		2	3	
	Transmittal Letter		4	5	
	Information Disclosure Statement (IDS) Form (SB08)		6	6	
Warnings:					
Information:					
2	Non Patent Literature	0001_15974343_pamd.pdf	105613	no	7
			ce1b56230810659fff4421635dfa2074cd3ac13d		
Warnings:					
Information:					
3	Non Patent Literature	0002_15978760_pamd.pdf	104335	no	7
			a4a2169f57a972cb8e410ca0f4d3062c4fc99bf1		
Warnings:					
Information:					
4	Non Patent Literature	0003_4820007us3_rerr_05222018.pdf	793277	no	6
			2ffb899eb84eaf0c594120858b6e7be257ae2e2		
Warnings:					
Information:					
5	Non Patent Literature	0004_15295594_supplemental_pamd.pdf	115921	no	10
			606caf50c912dfe72d12200abb802c6aec07a6e5		
Warnings:					
Information:					
6	Non Patent Literature	0005_4820003us2_foar_06042018.pdf	1192538	no	13
			95d9f7cae099f9b343c06b0075c77498aaa72b6b		
Warnings:					
Information:					

7	Non Patent Literature	0006_4820003us2_aarn_051818.pdf	142645 924a91caf321c39f7231eb76b2650cfd3d2d6d6	no	14
Warnings:					
Information:					
Total Files Size (in bytes):			2721283		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7
Filed: May 14, 2015
Examiner: Amber Orlando
Customer No.: 21186

Serial No.: 14/712,558
Due Date: N/A
Group Art Unit: 1776
Confirmation No.: 1934

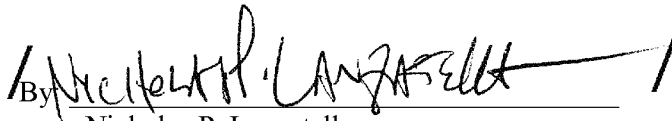
Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Communication Concerning Prior and Copending Applications (2 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (6).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
Customer No.: 21186

By 
Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPENDING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
15/997,091	June 4, 2018	4820.001U10	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/951,970	April 12, 2018	4820.001US8	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/974,343	May 8, 2018	4820.001US9	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/978,760	May 14, 2018	4820.007US4	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
15/853,029	December 22, 2017	4820.018US1	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPEENDING APPLICATIONS

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

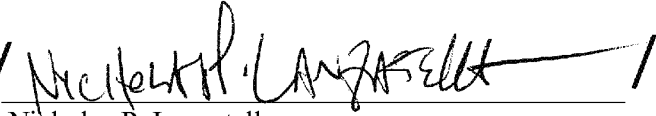
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date 6-21-2018

By



Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed after filing of the application or after the filing of the most recent RCE, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 19-0743 in order to have this Information Disclosure Statement considered.

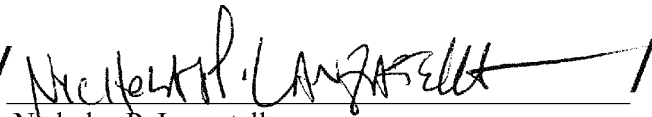
Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 6-21-2018

By 

Nicholas P. Lanzatella
Reg. No. 63,803

NPL:jj

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Edwin S. Olson et al.	Examiner:	AMBER ROSE ORLANDO
Serial No.:	14/712,558	Group Art Unit:	1776
Filed:	May 14, 2015	Docket No.:	4820.001US7
Customer No.:	21186	Confirmation No.:	1934
Title:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

SUPPLEMENTAL AMENDMENT

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

Please enter the following amendments:

IN THE CLAIMS

1-65. (Canceled)

66. (New) A method for treating a mercury-containing gas, the method comprising:
combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the
mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁻, or a combination thereof;
and

adding a particulate sorbent material comprising activated carbon into the mercury-
containing gas.

67. (New) The method of claim 66, wherein the pyrolysis char is a promoted pyrolysis char
that is promoted by the promoter.

68. (New) The method of claim 66, wherein the pyrolysis char and the promoter are added
prior to the combustor, within the combustor, or a combination thereof.

69. (New) The method of claim 66, wherein the pyrolysis char and the promoter are added
within the combustor.

70. (New) The method of claim 66, further comprising using a particle separation device to remove mercury from the flue gas and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas.

71. (New) The method of claim 70, wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising:

monitoring the mercury content of the cleaned gas; and

controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.

72. (New) The method of claim 66, wherein the promoter is Br₂, HBr, Br⁻, or a combination thereof.

73. (New) The method of claim 66, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

74. (New) The method of claim 66, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

75. (New) The method of claim 66, further comprising contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

76. (New) The method of claim 66, further comprising contacting the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

77. (New) The method of claim 76, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

78. (New) The method of claim 76, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

79. (New) A method for treating a mercury-containing gas, the method comprising:
combusting coal in a combustor comprising pyrolysis char and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁻, or a combination thereof;
adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

80. (New) The method of claim 79, wherein the pyrolysis char is a promoted pyrolysis char that has been promoted by the promoter.

81. (New) A method for treating a mercury-containing gas, the method comprising:
combusting coal in a combustor and adding within the combustor a pyrolysis char promoted by a promoter, to form the mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁻, or a combination thereof; and
adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.
82. (New) A method for treating a mercury-containing gas, the method comprising:
combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁻, or a combination thereof; and
adding a sorbent material comprising activated carbon into the mercury-containing gas.

SUPPLEMENTAL AMENDMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 6

Docket No: 4820.001US7

REMARKS

No claims are amended, claims 45-65 are canceled, claims 1-44 were previously canceled, and claims 66 to 82 are added; as a result, claims 66-82 are now pending in this application.

Claims 66-82 are similar to claims 45-65, with a difference that the independent claims do not require that the particulate sorbent injected into the flue gas be promoted in-flight, do not require chemical reaction of the sorbent and the mercury, and do not require removal of the mercury from the flue gas. No new matter is added via the new claims herein.

SUPPLEMENTAL AMENDMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 7

Docket No: 4820.001US7

CONCLUSION

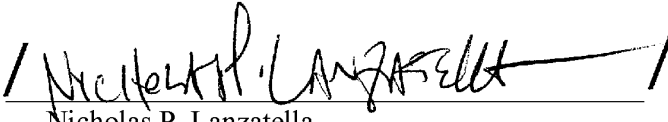
Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully Submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date June 22, 2018

By 
Nicholas P. Lanzatella
Reg. No. 63,803

Electronic Acknowledgement Receipt

EFS ID:	32973946
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Josef Louis Hoffmann/Megan Reed
Filer Authorized By:	Josef Louis Hoffmann
Attorney Docket Number:	4820.001US7
Receipt Date:	22-JUN-2018
Filing Date:	14-MAY-2015
Time Stamp:	10:51:22
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		SIGNED_4820_001US7_SuppA mdmt.pdf	105213	yes	8
			a89d069a56b3b48aa20e69a57f03de05b78 5fa45		

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Transmittal Letter	1	1	
Supplemental Response or Supplemental Amendment	2	2	
Claims	3	6	
Applicant Arguments/Remarks Made in an Amendment	7	8	
Warnings:			
Information:			
Total Files Size (in bytes):		105213	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

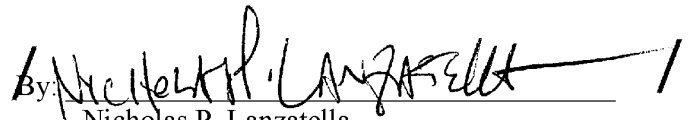
We are transmitting herewith the following attached items (as indicated with an "X"):

X Supplemental Amendment (7 pgs.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (l), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT	06/22/2018	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0	x \$100 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 3	= 1	x \$460 =	460
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE							460

(Column 1) (Column 2) (Column 3)

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

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

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

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

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

LIE
LINDA HUMES

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.

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 06/27/2018

LHUMES	SALE	#00000001	Mailroom Dt: 06/22/2018	190743	14712558
		01	FC : 1201	460.00	DA



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	07/02/2018		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MINNESOTA 55402				
UNITED STATES OF AMERICA			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			07/02/2018	ELECTRONIC

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

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

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

SLW@blackhillsip.com
uspto@slwip.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

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 66-78 and 82 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. Claim 66 claims combusting pyrolysis char, and a promoter comprising Br₂, HBr, Br⁻. As pyrolysis char is a byproduct of the combustion of coal and the promoter cannot be combusted as it is a halide. It is believed the applicant meant to claim combusting coal in the presence of pyrolysis char and a promoter and are interpreted as such in the rejection below.

The state of the prior art does not teach any examples of pyrolysis char or a promoter comprising Br₂, HBr, Br⁻ being combusted.

One having ordinary skill in the art would not look understand how pyrolysis char or a promoter comprising Br₂, HBr, Br⁻ can be combusted and pyrolysis char and promoter comprising Br₂, HBr, Br⁻ are final products or not able to be combusted.

There is no level of predictability and therefore would be a large quantity of experimentation needed.

There is no direction nor working example within the specification to show how pyrolysis char or a promoter comprising Br₂, HBr, Br⁻ are combusted.

Claim Rejections - 35 USC § 103

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

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

Claims 66-69, 72, 73, 75-77, 79-82 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nelson Jr. US 2004/00033716 in view of Comrie US 2007/0168213 and Wojtowicz US 6,103,205.

For claims 66, 79, 81 and 82 the Nelson Jr. reference discloses a method for treating a mercury-containing gas, the method comprising: combusting coal, to form the mercury-containing gas (paragraphs [0059] and [0060]); and adding a particulate sorbent material comprising activated carbon and a promoter wherein the promoter comprises Br₂, HBr, Br₂, or a combination thereof into the mercury-containing gas (paragraphs [0044], [0055], and [0060]). The reference does not explicitly combust the coal in the presence of the promoter and pyrolysis char.

The Wojtowicz et al. reference discloses pyrolysis char can be a cost effective alternative to activated carbon for the absorption of mercury (column 3, lines 8-19).

It would have been obvious to one having ordinary skill in the art to have modified the Nelson reference to include pyrolysis char as an addition or in place of activated carbon (Wojtowicz et al. column 3, lines 8-19) so as to provide a more cost effective absorbent.

The Comrie reference discloses that the sorbent compositions can be added anywhere within the coal burning process, before, during or after (paragraph [0006]).

It would have been obvious to one having ordinary skill in the art to have modified the Nelson and Wojtowicz et al. combination to either rearrange steps, or repeat steps to have the combusting coal in the presence of the promoter and activated carbon (i.e. the promoted sorbent of Nelson/ Wojtowicz et al. including activated carbon and/or pyrolysis char and the promoter comprises Br₂, HBr, Br⁻, or a combination thereof) so as to entrap the contaminants in the mercury containing gas rather than release them to the atmosphere (Comrie paragraph [0006]). Further the courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) and the selection of any order of mixing ingredients is prima facie obvious In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

For claims 67 and 80 the above reference do not explicitly state the pyrolysis char is a promoted pyrolysis char that is promoted by the promoter.

Nelson discloses promoting sorbents so as to provide a more effective sorbent as shown above.

Therefore it would have been obvious to one having ordinary skill in the art to modify the combination of Nelson, Comrie and Wojtowicz et al. to also promote the activated carbon/pyrolysis char of Wojtowicz to provide a more effective sorbent of mercury.

For claim 68 and 69, as shown above, the Comrie reference discloses the sorbent added prior to the combustor, within the combustor, or a combination thereof. The sorbent being pyrolysis char is shown by Wojtowicz and the promoter is disclosed by Nelson.

For claim 72, the Nelson reference discloses the promoter is Br₂, HBr, Br², or a combination thereof (as shown above).

For claim 73, the Nelson reference discloses the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof (paragraph [0040]).

For claim 75, the Nelson reference discloses contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeCl₄, CS₂, P₂S₅, and combinations thereof (paragraph [0064]).

For claims 76 and 77, the Nelson reference discloses contacting the sorbent material with Br₂ or HBr (as shown above).

It would have been obvious to one having ordinary skill in the art to have modified Nelson to include to introduce both and therefore include the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof so as to ensure that the entirety of the carbon has been promoted.

Claims 70-71 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nelson Jr. US 2004/00033716, Comrie US 2007/0168213 and Wojtowicz US 6,103,205 as applied in claim 66 above and further in view of Vosteen et al. US 6,848,358.

For claim 70, the Nelson reference discloses using a particle separation device to remove mercury from the flue gas (paragraph [0060]).

Nelson, Comrie and Wojtowicz references in combination disclose each of the steps above and therefore the results of performing those steps would be the same (i.e. collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas).

Further the Vosteen et al. reference discloses monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, an injection rate of injecting the sorbent into the mercury-containing gas, the sorbent composition, or a combination

thereof so as to obtain a desired level of mercury removal (column 5, lines 47-63). The Vosteen reference clearly shows that complete removal of the mercury in the mercury-containing gas (i.e. greater than 70% closer to 100% is desired) and is desired and obtainable by adding more absorbent.

For claim 71, the Nelson reference discloses the method is a method for reducing mercury in the mercury-containing gas to a desired level (paragraph [0060]). The reference does not disclose monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.

The Vosteen et al. reference discloses the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level (column 5, lines 47-63).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Nelson reference to include the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level (Vosteen column 5, lines 47-63) to achieve a desired level of mercury removal.

Claims 74 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nelson Jr. US 2004/00033716, Comrie US 2007/0168213 and Wojtowicz US 6,103,205 as applied in claim 66 above and further in view of Gadkaree et al. US 6,136,749.

For claim 74, the Nelson reference does not disclose adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

The Gadkaree reference discloses adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof (column 3, lines 54-65).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Nelson reference to include adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof (Gadkaree column 3, lines 54-65) so as to enhance the activity of the activated carbon.

Claims 76-78 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nelson Jr. US 2004/00033716, Comrie US 2007/0168213 and Wojtowicz US 6,103,205 as applied in claim 66 above and further in view of Srinivasachar et al. US 6,848,374.

For claims 76 and 77, the Nelson reference does not explicitly state the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

The Srinivasachar reference discloses the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art to have modified the Nelson reference to include the sorbent material with a secondary component chosen from halogens, hydrogen

halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

For claim 78, the Srinivasachar reference discloses the secondary component is chosen from I₂, HI, and combinations thereof (column 6, lines 2-20).

Double Patenting

Applicant is advised that should claim 1 be found allowable, claim 72 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application,

or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(I)(1) - 706.02(I)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 66-74 and 76-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1 of U.S. Patent No. 7,435,286 ('286) in view of Comrie US 2007/0168213 and Wojtowizz US 6,103,205.

Claim 66-74 and 79-82 of the current application corresponds to claim 1 of the '286 reference except for the presence of pyrolysis char and the order of adding ingredients. As shown above such features were known and obvious within the prior art (Comrie and Wojtowizz).

Claim 76-78, correspond to claims 7 and 8 of '286.

Claims 75 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1 of U.S. Patent No. 7,435,286 ('286) in view of Comrie US 2007/0168213, Wojtowizz US 6,103,205 and Downs et al. US6,284,199.

Claim 75 of the current application corresponds to claim 1 except for the presence of the mercury stabilizing agent.

The Downs et al. reference discloses the presence of a mercury stabilizing agent (column 6, lines 5-8).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the '286 to include the mercury stabilizing agent (Downs et al. column 6, lines 5-8) so as to enable mercury control.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

Application/Control Number: 14/712,558
Art Unit: 1776

Page 12

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

<i>Examiner-Initiated Interview Summary</i>	Application No. 14/712,558	Applicant(s) Olson et al.		
	Examiner AMBER R ORLANDO	Art Unit 1776	AIA (First Inventor to File) Status No	Page 1 of 2

All participants (applicant, applicants representative, PTO personnel):

1. AMBER R ORLANDO (Primary Examiner); Telephonic 2. Nicholas Lansatella (Inventor); Telephonic

Date of Interview: 19 June 2018

Claims Discussed: 45-65

Issues Discussed:

Item(s) under 35 U.S.C. 112:

Claim Interpretation and/or scope:
Interviews conducted on multiple occasions from 06/19/2018-06/21/2018. The examiner pointed to 112(a) and (b) issues stemming from the newly filed claims 45-65. The applicant pointed to the specification stating before during or after for support for the sorbent being within the combustion process. The examiner agreed that there was support for that limitation. The examiner pointed out that there was no support for the inflight reaction within the mercury containing gas of the promoter and that of the sorbent material. It was agreed that changing the preamble of the claim to be "treating" and removing the the limitations regarding reacting the promotion of the sorbent material would help in overcoming the 112 issues.

/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	

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

U.S. Patent and Trademark Office
PTOL-413/413b (Rev. 01/01/2015)

Interview Summary

Paper No. 20180624

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of 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.

Notice of References Cited	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.	
	Examiner AMBER R ORLANDO	Art Unit 1776	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-6284199-B1	09-2001	Downs; William	B01D47/06	422/168
*	B	US-6103205-A	08-2000	Wojtowicz; Marek A.	B01D53/04	423/210
	C					
	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. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	06/27/2017	AO

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
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	12/01/2017	AO
Inventor Search (DAV)	12/01/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	06/25/2018	AO

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

<i>Search Notes</i> 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

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

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1	Attorney Docket No: 4820.001US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 15/449,112, Advisory Action mailed 04-24-18", 3 pgs			
	"Application Serial No. 15/449,112, Response filed 02-15-18 to Final Office Action mailed 02-15-18", 13 pgs.			
	"Application Serial No. 15/449,112, Response filed 04-06-18 to Final Office Action mailed 02-15-18", 13 pgs			

EXAMINER /AMBER R. ORLANDO/

DATE CONSIDERED

06/25/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1	Attorney Docket No: 4820.001US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20080107579A1	5/8/2008	Downs, William, et al.
	US-20100024642A1	2/4/2010	Fukumoto, Kazuhiro, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2757309A1	10/28/2010	Olson, Edwin S, et al.	
	CA-2757309C	1/3/2017	Olson, Edwin S, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/449,112, Final Office Action mailed 02-15-18", 13 pgs	
	"Application Serial No. 15/449,112, Response filed 01-16-18 to Non Final Office Action mailed 09-27-17", 16 pgs	
	"Application Serial No. 15/589,359, Non Final Office Action mailed 02-21-18", 15 pgs	
	"Application Serial No. 15/589,359, Preliminary Amendment filed 01-03-18", 6 pgs	
	ZHU, JIANZHONG, et al., "Enhanced mercury ion adsorption by amine-modified activated carbon", Journal of hazardous materials 166, (2009), 866-872	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

06/25/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	"20120288427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:02
L2	7	copper with oxide with tenorite and honeycomb	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:06
L3	95	copper with oxide with tenorite	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:12
L4	4	copper with oxide with tenorite with catalyst	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:12
L5	93	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:31
L6	93	"6136749"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:32
L7	19	mercury stabilizing reagent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:41
L8	6	(mercury stabilizing reagent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:42
L9	4	promoted with sorbent and (secondary component with halogen).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 12:50
L11	12	mercury with stabilize with se	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 13:26

L12	38	mercury with stabiliz\$4 with se	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 13:26
L13	281	inject\$4 with flue with (se or sulfur or s)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 13:27
L14	44	inject\$4 with flue with (se or sulfur or s) and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 13:27
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602,	US-PGPUB;	ADJ	ON	2015/03/17

		B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	USPAT			13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2016/09/29 16:18

			IBM_TDB			
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:22
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05

S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2016/11/16 11:28

			DERWENT; IBM_TDB			
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54
S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602,	US-PGPUB;	ADJ	ON	2016/11/16

		B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	USPAT			15:23
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787"	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20

		"3194629" "3662523" "3786619" "3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.				
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31
S79	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
S80	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358" "6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41
S81	593	honeycomb with plug\$4 and plug\$4 with length	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S82	0	honeycomb with plug\$4 and plug\$4 with length with less than with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S83	0	honeycomb with plug\$4 and plug\$4 with length with less than	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45

S84	127	honeycomb with plug\$4 and plug\$4 with length with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:46
S85	241	honeycomb with plug\$4 and plug\$4 with length with mm	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:47
S86	41	honeycomb with plug\$4 and plug\$4 with length with "3 mm "	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:49
S87	28	honeycomb with plug\$4 and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:52
S88	28	honeycomb and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:53
S89	43	honeycomb and plug\$4 with porosity with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:06
S90	20	honeycomb and plug\$4 with pore (size or diameter) with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:07
S91	8	saw with honeycomb with filter	US-PGPUB; USPAT	ADJ	ON	2017/06/29 13:31
S92	230	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/12/01 14:36
S93	1	pyrolysis char with coal with combust\$4	US-PGPUB; USPAT	ADJ	ON	2018/06/24 13:54
S94	52	pyrolysis char with activated carbon	US-PGPUB; USPAT	ADJ	ON	2018/06/24 14:04
S95	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 06:58
S96	339	pyrolysis char	US-PGPUB; USPAT	ADJ	ON	2018/06/25 07:42
S97	0	pyrolysis char with mercury	US-PGPUB; USPAT	ADJ	ON	2018/06/25 07:43
S98	1	pyrolysis char with absorb\$4	US-PGPUB; USPAT	ADJ	ON	2018/06/25 07:43
S99	52	pyrolysis char with activated carbon	US-PGPUB; USPAT	ADJ	ON	2018/06/25 07:43
S100	52	pyrolysis char with activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 07:43
S101	52	pyrolysis\$4 char with activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 07:45
S102	0	pyrolysis\$4 char with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 07:46
S103	2	pyrolysis\$4 char with absorb\$4	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2018/06/25 07:46

EAST Search History

			EPO; JPO			
S104	53	"6103205"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/06/25 07:48

6/ 25/ 2018 1:49:02 PM
C:\ Users\ amillerharris\ Documents\ EAST\ Workspaces\ 12429058.wsp

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1	Attorney Docket No: 4820.001US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20090297413A1	12/3/2009	Olson, Edwin S, et al.
	US-20180133646A1	5/17/2018	Pavlish, John H, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15//974,343 Preliminary Amendment Filed 5-15-2018", 7 pgs.		
	"Application Serial No. 15//978,760, Preliminary Amendment Filed 5-15-2018", 7 pgs.		
	"Application Serial No. 15/295,594, Restriction Requirement mailed 05-22-18", 6 pgs		
	"Application Serial No. 15/295,594, Supplemental Amendment Filed 5-15-2018", 10 pgs.		
	"Application Serial No. 15/589,359, Final Office Action mailed 06-04-18", 13 pgs		
	"Application Serial No. 15/589,359, Response filed 05-18-18 to Non Final Office Action mailed 02-21-18", 14 pgs.		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

06/25/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Application No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.111

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

Applicant has received the Non-Final Office Action dated July 2, 2018. Please enter the following.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: October 2, 2018

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

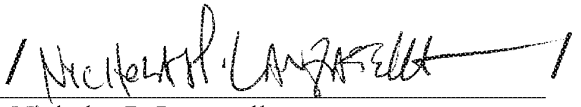
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Amendment and Response under 37 C.F.R. § 1.111 (11 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (19).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Steven M. Reid/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt	
EFS ID:	33465998
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Steven M. Reid/Megan Reed
Filer Authorized By:	Steven M. Reid
Attorney Docket Number:	4820.001US7
Receipt Date:	14-AUG-2018
Filing Date:	14-MAY-2015
Time Stamp:	16:36:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	081518INTEFSW00003508190743
Deposit Account	190743
Authorized User	Megan Reed
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
37 CFR 1.20 (Post Issuance fees)
37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SIGNED_4820_001US7_NFOAR esponse_SIDS.pdf	230184	yes	15
			8c73252d56e38deea61625d7f39b9b8d09c05ee3		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Information Disclosure Statement (IDS) Form (SB08)		15	15	
	Transmittal Letter		13	14	
	Applicant Arguments/Remarks Made in an Amendment		6	12	
	Claims		3	5	
	Amendment/Req. Reconsideration-After Non-Final Reject		2	2	
	Transmittal Letter		1	1	
Warnings:					
Information:					
2	Non Patent Literature	4820_003CN1AARN_20180327. pdf	611918	no	20
			e803c758fbd8b9d586d79b3ae62977a6c3aad3ce		
Warnings:					
Information:					
3	Non Patent Literature	4820003CN1_OAR_MISC_0116 18.pdf	432179	no	8
			780cf305cd2ecfc651a1f0a92f3368b0feed2b47		
Warnings:					
Information:					
4	Non Patent Literature	4820003US2_AARN_072618. pdf	160814	no	14
			3a69ae03cf17fc2967816335b2d7b5f13a7b8972		

Warnings:					
Information:					
5	Non Patent Literature	4820007US3_RRR1MO_072418.pdf	116107	no	9
			d5f9c0f300d0d5effb5f15902c28fb1a4eeb1316		
Warnings:					
Information:					
6	Non Patent Literature	4820007US3_rspRR.pdf	138605	no	9
			7690b8142f637529236cb30e3c32db3b38e5d35c		
Warnings:					
Information:					
7	Non Patent Literature	4820007US4_aarn_71318.pdf	206412	no	12
			3383c8395b3ba9b63b28eb5c719d0febfed6b5e8		
Warnings:					
Information:					
8	Non Patent Literature	137193389_AAR_MISC_090517_201709042.pdf	85747	no	7
			0a1ee377478eb8d04c9ee1b26b35e402bd810b55		
Warnings:					
Information:					
9	Non Patent Literature	jp_49_53593.pdf	108657	no	1
			29ab18e60a4415894db7b31963380572f115d68c		
Warnings:					
Information:					
10	Non Patent Literature	Supp_EU_Search_Rpt_1262012.pdf	71429	no	2
			6be4fb2af74048d89e93afe9c44dd589a5f6bf96		
Warnings:					
Information:					
11	Non Patent Literature	_2871422_AAR_MISC_022718_20180226.pdf	712003	no	53
			704819131ebc8e6cb5e38f085536ebfd79c9453a		
Warnings:					
Information:					

12	Non Patent Literature	_2871422AARMISC20170621_Response_as_filed_004062_0042_20170621.pdf	2379657	no	41
			1030b907cbe5435d21129c7190ed06120237266e		
Warnings:					
Information:					
13	Non Patent Literature	_4820001U10_OARN_PE_07272018.pdf	1583458	no	13
			599daa97097122689536bf035f5273df8113f8fe		
Warnings:					
Information:					
14	Non Patent Literature	_4820001US9_OARN_07272018.pdf	1492385	no	12
			82ada5fbded30372fcc3eb3edfe849c3e4d7f48e		
Warnings:					
Information:					
15	Non Patent Literature	_4820005US1_NOAR_07122018.pdf	1380205	no	8
			2a970f7be1c4de7fd99c680c5ea1890b9cf727de		
Warnings:					
Information:					
16	Non Patent Literature	_4820006CA1_OAR_MISC_083117.pdf	363326	no	4
			b82aa9361773c3c965a74e4bbd2b8d497daf6df7		
Warnings:					
Information:					
17	Non Patent Literature	_4820006CA1_OAR_MISC_04242018.pdf	423291	no	4
			c4fa0dd3b6de4bdfb5400b5902dd77058772f24c		
Warnings:					
Information:					
18	Non Patent Literature	_4820006EP1_OAR_MISC_042417.pdf	653589	no	8
			8fcae324127951e2ae65577840252787b4ac1d7		
Warnings:					
Information:					

19	Non Patent Literature	_4820007US3_RERR_06292018.pdf	732397 8c931e7e91267ac6979c587e6faabf43213b710a	no	5
Warnings:					
Information:					
20	Non Patent Literature	_4820007US4_OARNPE_06292018.pdf	1202446 14e2f6e1c1f251d3f88ec40770c9e4c96d3866e2	no	9
Warnings:					
Information:					
21	Fee Worksheet (SB06)	fee-info.pdf	30119 2fc166fb08146665d1d936c96fa1ac21d05eef2	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			13114928		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Application No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.111

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

Applicant has received the Non-Final Office Action dated July 2, 2018. Please enter the following.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: October 2, 2018

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

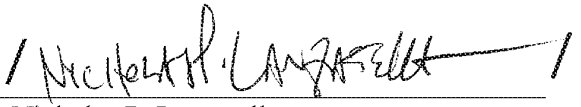
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Amendment and Response under 37 C.F.R. § 1.111 (11 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (19).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Steven M. Reid/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt

EFS ID:	33465998
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Steven M. Reid/Megan Reed
Filer Authorized By:	Steven M. Reid
Attorney Docket Number:	4820.001US7
Receipt Date:	14-AUG-2018
Filing Date:	14-MAY-2015
Time Stamp:	16:36:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	081518INTEFSW00003508190743
Deposit Account	190743
Authorized User	Megan Reed
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
37 CFR 1.20 (Post Issuance fees)
37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SIGNED_4820_001US7_NFOAR esponse_SIDS.pdf	230184	yes	15
			8c73252d56e38deea61625d7f39b9b8d09c05ee3		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Information Disclosure Statement (IDS) Form (SB08)		15	15	
	Transmittal Letter		13	14	
	Applicant Arguments/Remarks Made in an Amendment		6	12	
	Claims		3	5	
	Amendment/Req. Reconsideration-After Non-Final Reject		2	2	
	Transmittal Letter		1	1	
Warnings:					
Information:					
2	Non Patent Literature	4820_003CN1AARN_20180327. pdf	611918	no	20
			e803c758fbd8b9d586d79b3ae62977a6c3aad3ce		
Warnings:					
Information:					
3	Non Patent Literature	4820003CN1_OAR_MISC_0116 18.pdf	432179	no	8
			780cf305cd2ecfc651a1f0a92f3368b0feed2b47		
Warnings:					
Information:					
4	Non Patent Literature	4820003US2_AARN_072618. pdf	160814	no	14
			3a69ae03cf17fc2967816335b2d7b5f13a7b8972		

Warnings:					
Information:					
5	Non Patent Literature	4820007US3_RRR1MO_072418.pdf	116107	no	9
			d5f9c0f300d0d5effb5f15902c28fb1a4eeb1316		
Warnings:					
Information:					
6	Non Patent Literature	4820007US3_rspRR.pdf	138605	no	9
			7690b8142f637529236cb30e3c32db3b38e5d35c		
Warnings:					
Information:					
7	Non Patent Literature	4820007US4_aarn_71318.pdf	206412	no	12
			3383c8395b3ba9b63b28eb5c719d0febfed6b5e8		
Warnings:					
Information:					
8	Non Patent Literature	137193389_AAR_MISC_090517_201709042.pdf	85747	no	7
			0a1ee377478eb8d04c9ee1b26b35e402bd810b55		
Warnings:					
Information:					
9	Non Patent Literature	jp_49_53593.pdf	108657	no	1
			29ab18e60a4415894db7b31963380572f115d68c		
Warnings:					
Information:					
10	Non Patent Literature	Supp_EU_Search_Rpt_1262012.pdf	71429	no	2
			6be4fb2af74048d89e93afe9c44dd589a5f6bf96		
Warnings:					
Information:					
11	Non Patent Literature	_2871422_AAR_MISC_022718_20180226.pdf	712003	no	53
			704819131ebc8e6cb5e38f085536ebfd79c9453a		
Warnings:					
Information:					

12	Non Patent Literature	_2871422AARMISC20170621_Response_as_filed_004062_0042_20170621.pdf	2379657	no	41
			1030b907cbe5435d21129c7190ed06120237266e		
Warnings:					
Information:					
13	Non Patent Literature	_4820001U10_OARN_PE_07272018.pdf	1583458	no	13
			599daa97097122689536bf035f5273df8113f8fe		
Warnings:					
Information:					
14	Non Patent Literature	_4820001US9_OARN_07272018.pdf	1492385	no	12
			82ada5fbded30372fcc3eb3edfe849c3e4d7f48e		
Warnings:					
Information:					
15	Non Patent Literature	_4820005US1_NOAR_07122018.pdf	1380205	no	8
			2a970f7be1c4de7fd99c680c5ea1890b9c727de		
Warnings:					
Information:					
16	Non Patent Literature	_4820006CA1_OAR_MISC_083117.pdf	363326	no	4
			b82aa9361773c3c965a74e4bbd2b8d497daf6df7		
Warnings:					
Information:					
17	Non Patent Literature	_4820006CA1_OAR_MISC_04242018.pdf	423291	no	4
			c4fa0dd3b6de4bdfb5400b5902dd77058772f24c		
Warnings:					
Information:					
18	Non Patent Literature	_4820006EP1_OAR_MISC_042417.pdf	653589	no	8
			8fcae324127951e2ae65577840252787b4ac1d7		
Warnings:					
Information:					

19	Non Patent Literature	_4820007US3_RERR_06292018.pdf	732397 8c931e7e91267ac6979c587e6faabf43213b710a	no	5
Warnings:					
Information:					
20	Non Patent Literature	_4820007US4_OARNPE_06292018.pdf	1202446 14e2f6e1c1f251d3f88ec40770c9e4c96d3866e2	no	9
Warnings:					
Information:					
21	Fee Worksheet (SB06)	fee-info.pdf	30119 2fc166fb08146665d1d936c96fa1ac21d05eef2	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			13114928		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 15/295,594, Response filed 07-03-18 to Restriction Requirement mailed 05-22-18", 9 pgs.			
	"Application Serial No. 15/295,594, Response filed 07-24-18 to Restriction Requirement mailed 06-29-18", 9 pgs.			
	"Application Serial No. 15/295,594, Restriction Requirement mailed 06-29-18", 5 pgs			
	"Application Serial No. 15/449,112, Notice of Allowance mailed 07-12-18", 8 pgs			
	"Application Serial No. 15/589,359, Response filed 07-26-18 to Non Final Office Action mailed 06-04-18", 14 pgs.			
	"Application Serial No. 15/974,343, Non Final Office Action mailed 07-27-18", 12 pgs			
	"Application Serial No. 15/978,760, Response filed 07-13-18 to Non Final Office Action mailed 06-29-18", 12 pgs			
	"Application Serial No. 15/978,760, Non Final Office Action mailed 06-29-18", 9 pgs			
	"Application Serial No. 15/997,091, Non Final Office Action mailed 07-27-18", 13 pgs			
	"Canadian Application Serial No. 2,871,422, Office Action mailed 04-24-18", 4 pgs			
	"Canadian Application Serial No. 2,871,422, Office Action mailed 08-31-17", 4 pgs			
	"Canadian Application Serial No. 2,871,422, Response filed 02-26-18 to Office Action mailed 08-31-17", w/ Amended Claims, 53 pgs			
	"Canadian Application Serial No. 2,871,422, Response filed 06-21-17 to Office Action mailed 12-22-16", 41 pgs			
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 01-16-18", (English Translation), 8 pgs			
	"Chinese Application Serial No. 201480025701.9, Response filed 03-27-18 to Office Action mailed 01-16-18", w/ English Claims, 20 pgs			
	"DATABASE WPI Week 197450", Thomson Scientific, London, GB; AN 1974-86199V XP002514926			
	"European Application Serial No. 13719338.9, Notification Regarding Rule 164 and Article 94(3) EPC mailed 04-24-17", 8 pgs			
	"Response filed 09-04-17 to Notification Regarding Rule 164 and Article 94(3) EPC mailed 04-24-17", 7 pgs			
	"Supplementary European Search Report, dated December 6, 2012", 2 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

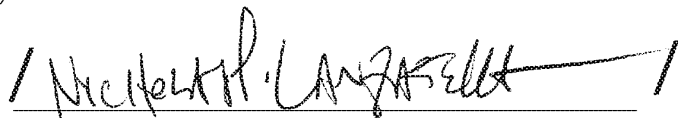
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date August 14, 2018

By



Nicholas P. Lanzatella
Reg. No. 63,803

NPL:mlr1

REMARKS

This responds to the Non-Final Office Action dated July 2, 2018.

No amendments are presently made to the claims. No claims are presently canceled, and claims 1-65 were canceled previously. No new claims are presently added. As a result, claims 66-82 are now pending in this application.

Interview Summary

Applicant wishes to thank Examiner Orlando for the courtesy of a telephone interview on March 6, 2018. During the interview, various issues of support and priority of the claims were discussed. The Examiner agreed that a CIP including the disclosure of the priority provisional application would resolve the § 112 issues in the Final Office Action mailed 12/6/2018. Subsequently, Applicant has amended the present claims via the supplemental amendment of 7/22/2018 to avoid the § 112 rejections asserted by the Final Office Action, and has filed several Track 1 CIP applications incorporating the disclosure of the provisional application.

The Rejection of Claims Under §112

I. The Office Action rejected claims 66-78 and 82 under 35 U.S.C. § 112(a) or 35 U.S.C. § 112 (pre-AIA), first paragraph, as allegedly failing to comply with the enablement requirement.

The Office Action states at pages 2-3:

As pyrolysis char is a byproduct of the combustion of coal and the promoter cannot be combusted as it is a halide. It is believed the applicant meant to claim combusting coal in the presence of pyrolysis char and a promoter and are interpreted as such in the rejection below.

The state of the prior art does not teach any examples of pyrolysis char or a promoter comprising Br₂, HBr, Br⁻ being combusted.

One having ordinary skill in the art would not look understand how pyrolysis char or a promoter comprising Br₂, HBr, Br⁻ can be combusted and pyrolysis char and promoter comprising Br₂, HBr, Br⁻ are final products or not able to be combusted.

There is no level of predictability and therefore would be a large quantity of experimentation needed.

There is no direction nor working example within the specification to show how pyrolysis char or a promoter comprising Br₂, HBr, Br⁻ are combusted.

This rejection is respectfully traversed. A mixture can be combusted without each individual component of the mixture being combusted.

Dependent claims 67-78 are apparently rejected solely due to their direct or indirect dependence from independent claim 66. Accordingly, dependent claims 67-78 are patentable for the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 66-78 and 82 under 35 U.S.C. § 112(a) or 35 U.S.C. § 112 (pre-AIA), first paragraph.

The Rejection of Claims Under §103

II. The Office Action rejected claims 66-69, 72-73, 75-77, and 79-82 under 35 U.S.C. § 103(a) over U.S. patent publication no. 2004/0003716 (“Nelson”) in view of U.S. patent publication no. 2007/0168213 (“Comrie”) and U.S. patent no. 6,103,205 (“Wojtowicz”).

This rejection is respectfully traversed.

The Office Action admits that Nelson, mentioning a sorbent that is promoted outside of a flue gas, does not describe or suggest combustion of coal in the presence of a promoter and pyrolysis char. The Office Action alleges that a person of ordinary skill in the art would combine Wojtowicz’s pyrolysis char sorbent with Nelson’s activated carbon. The Office Action alleges that this combination would be further modified by Comrie’s addition of sorbent compositions before or during the burning of coal, to combust coal in the presence of pyrolysis char and a promoter. Applicant respectfully disagrees. As explained herein at **II(A)**, Comrie is not prior art. As explained herein at **II(B)**, the cited references cannot be combined to achieve the presently claimed invention. As explained herein at **II(C)**, the presently claimed invention has advantages that could not be predicted by a person of ordinary skill in the art before the invention was made. Further, as explained herein at **II(D)**, the next Office Action cannot be properly made final.

II(A). Comrie is not prior art.

Comrie was published July 19, 2007, and the earliest priority is to a provisional application filed January 19, 2006. In contrast, the present application is a continuation that derives priority from a provisional application filed August 30, 2004 and converted to a U.S. Utility application on August 22, 2005. The present application has priority that is one year and five months prior to

Comrie's earliest priority date; even if only the first U.S. Utility application is considered for support, Comrie's earliest priority date is still about five months later. Comrie is not prior art and could not be considered by a person of ordinary skill in the art prior to the time the present invention was made and the present application filed.

II(B). The cited references cannot be combined to achieve the presently claimed invention.

Nelson mentions promoting activated carbon outside of flue gas, and then adding the activated carbon to flue gas.

Wojtowicz mentions using sorbent including pyrolysis char in a flue gas to remove mercury.

No cited reference that is available as prior art to the present application describes or suggests combusting coal in the presence of a promoter that includes Br₂, HBr, or Br⁻. Therefore, independent claims 66, 79, 81, 82 are patentable.

II(C). The presently claimed invention has advantages that could not be predicted by a person of ordinary skill in the art before the invention was made.

The inventors of the present application have discovered that by combusting coal in the presence of a promoter, and by placing a sorbent in the mercury-containing gas, as presently claimed, the sorbent can be promoted by the promoter in-flight in the mercury-containing gas. Promotion of the sorbent in the mercury-containing gas has certain advantages that would be impossible for a person of ordinary skill in the art hypothetically having the cited prior art references in-hand.

Applicant's continuation-in-part U.S. application no. 15/853,029, published as U.S. patent publication no. 2018/0133646, includes experimental data in Part II of the Examples that compares the performance of activated sorbents added to the flue gas and promoted in-flight in the mercury-containing gas by bromide promoters that are added to the combustor to the performance of activated sorbents that are promoted outside of the flue gas and then added to the flue gas. As shown in Table 1 and as explained in paragraphs [0116]-[0117], promotion of the activated carbon in-flight in the mercury containing gas yielded significantly improved mercury capture compared to the activated carbon that was promoted before adding to the mercury-containing gas.

The M.P.E.P. at the beginning of § 2143.02 states (emphasis added) “[a] rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, *and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.*” There is no way to predict from the presently cited references available as prior art the superior mercury capture discovered by the present inventors that occurs when activated carbon is promoted in-flight in the mercury-containing gas, as occurs when following the present claims. The presently claimed invention therefore has advantages that could not be predicted by a person of ordinary skill in the art before the invention was made; accordingly, independent claims 66, 79, 81, 82 cannot be obvious over the cited references available as prior art.

Dependent claims 67-69, 72-73, 75-77, and 80 are dependent on independent claims 66 or 79. As such, these dependent claims incorporate all the features of independent claims 66 or 79. Accordingly, dependent claims 67-69, 72-73, 75-77, and 80 are patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 66-69, 72-73, 75-77, and 79-82 under 35 U.S.C. § 103(a) over Nelson in view of Comrie and Wojtowicz.

II(D). The next Office Action cannot be made final.

As explained herein at **II(A)-II(C)**, the present claims are patentable over the cited references. Applicant has not amended the claims and, as such, has not introduced any new features or limitations which would suffice under MPEP §706.07(a) to render any subsequent action on the merits final. If the PTO wishes to issue a further action in response to the remarks presented herein, Applicant respectfully submits that such action should be non-final.

III. The Office Action rejected claims 70-71 under 35 U.S.C. § 103(a) over U.S. patent publication no. 2004/0003716 (“Nelson”) in view of U.S. patent publication no. 2007/0168213 (“Comrie”), U.S. patent no. 6,103,205 (“Wojtowicz”), and U.S. patent no. 6,878,358 (“Vosteen”).

This rejection is respectfully traversed.

As explained herein at **II**, independent claim 66 is patentable over Nelson, Comrie, and Wojtowicz. Vosteen fails to remedy the deficiencies of Nelson, Comrie, and Wojtowicz; therefore, claim 66 is patentable over this combination of references.

Dependent claims 70-71 are directly or indirectly dependent on independent claim 66. As such, these dependent claims incorporate all the features of claim 66. Accordingly, claims 70-71 are patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 70-71 under 35 U.S.C. § 103(a) over Nelson in view of Comrie, Wojtowicz, and Vosteen.

IV. The Office Action rejected claim 74 under 35 U.S.C. § 103(a) over U.S. patent publication no. 2004/0003716 (“Nelson”) in view of U.S. patent publication no. 2007/0168213 (“Comrie”), U.S. patent no. 6,103,205 (“Wojtowicz”), and U.S. patent no. 6,136,749 (“Gadkaree”).

This rejection is respectfully traversed.

As explained herein at **II**, independent claim 66 is patentable over Nelson, Comrie, and Wojtowicz. Gadkaree fails to remedy the deficiencies of Nelson, Comrie, and Wojtowicz; therefore, claim 66 is patentable over this combination of references.

Dependent claim 74 is dependent on independent claim 66. As such, this claim incorporates all the features of claim 66. Accordingly, dependent claim 74 is patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 74 under 35 U.S.C. § 103(a) over Nelson in view of Comrie, Wojtowicz, and Gadkaree.

V. The Office Action rejected claims 76-78 under 35 U.S.C. § 103(a) over U.S. patent publication no. 2004/0003716 (“Nelson”) in view of U.S. patent publication no. 2007/0168213 (“Comrie”), U.S. patent no. 6,103,205 (“Wojtowicz”), and U.S. patent no. 6,848,374 (“Srinivasachar”).

This rejection is respectfully traversed.

As explained herein at **II**, independent claim 66 is patentable over Nelson, Comrie, and Wojtowicz. Srinivasachar fails to remedy the deficiencies of Nelson, Comrie, and Wojtowicz; therefore, claim 66 is patentable over this combination of references.

Dependent claims 76-78 are dependent on independent claim 66. As such, these dependent claims incorporate all the features of claim 66. Accordingly, dependent claims 76-78 are patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 76-78 under 35 U.S.C. § 103(a) over Nelson in view of Comrie, Wojtowicz, and Srinivasachar.

Double Patenting Rejection

VI. The Office Action rejected claims 66-74 and 76-82 for nonstatutory double patenting as over claim 1 of U.S. patent no. 7,435,286 (“the ‘286”) in view of U.S. patent publication no. 2007/0168213 (“Comrie”) and U.S. patent no. 6,103,205 (“Wojtowicz”).

Applicant does not admit that claims 66-74 and 76-82 are obvious over claim 1 of ‘286 in view of Comrie and Wojtowicz. As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but does not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection upon an indication of allowable claims.

VII. The Office Action rejected claim 75 for nonstatutory double patenting over claim 1 of U.S. patent no. 7,435,286 (“the ‘286”) in view of U.S. patent publication no. 2007/0168213 (“Comrie”), U.S. patent no. 6,103,205 (“Wojtowicz”), and U.S. patent no. 6,284,199 (“Downs”).

Applicant does not admit that claim 75 is obvious over claim 1 of the ‘286 in view of Comrie, Wojtowicz, and Downs. As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but does not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection upon an indication of allowable claims.

CONCLUSION

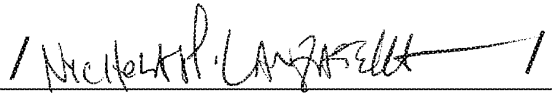
It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date August 14, 2018

By 

Nicholas P. Lanzatella
Reg. No. 63,803

IN THE CLAIMS

Please amend the claims as follows:

1-65. (Canceled)

66. (Previously Presented) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁺, or a combination thereof; and
adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

67. (Previously Presented) The method of claim 66, wherein the pyrolysis char is a promoted pyrolysis char that is promoted by the promoter.

68. (Previously Presented) The method of claim 66, wherein the pyrolysis char and the promoter are added prior to the combustor, within the combustor, or a combination thereof.

69. (Previously Presented) The method of claim 66, wherein the pyrolysis char and the promoter are added within the combustor.

70. (Previously Presented) The method of claim 66, further comprising using a particle separation device to remove mercury from the flue gas and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas.

71. (Previously Presented) The method of claim 70, wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising:
monitoring the mercury content of the cleaned gas; and
controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.

72. (Previously Presented) The method of claim 66, wherein the promoter is Br₂, HBr, Br⁻, or a combination thereof.

73. (Previously Presented) The method of claim 66, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

74. (Previously Presented) The method of claim 66, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

75. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

76. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

77. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

78. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

79. (Previously Presented) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor comprising pyrolysis char and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br₂, HBr, Br⁻, or a combination thereof;

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

80. (Previously Presented) The method of claim 79, wherein the pyrolysis char is a promoted pyrolysis char that has been promoted by the promoter.

81. (Previously Presented) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor and adding within the combustor a pyrolysis char promoted by a promoter, to form the mercury-containing gas, wherein the promoter comprises Br_2 , HBr , Br^- , or a combination thereof; and

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

82. (Previously Presented) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises Br_2 , HBr , Br^- , or a combination thereof; and

adding a sorbent material comprising activated carbon into the mercury-containing gas.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 14/712,558		Filing Date 05/14/2015		☐ 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), (l), 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(j))	minus 20 =	*			X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*			X \$	=			
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.					TOTAL				
APPLICATION AS AMENDED – PART II									
(Column 1)		(Column 2)		(Column 3)					
AMENDMENT	08/14/2018	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	* 17	Minus	** 20	= 0	x \$100 =		0	
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 0	x \$460 =		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(j))	*	Minus	**	=	X \$		=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$		=	
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									
						SLIE TONYA MCBRIDE			

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	14712558
	Filing Date	2015-05-14
	First Named Inventor	Edwin S. Olson
	Art Unit	1776
	Examiner Name	Amber Orlando
	Attorney Docket Number	4820.001US7

U.S.PATENTS							Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1						

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

Add

U.S.PATENT APPLICATION PUBLICATIONS							Remove
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1	20180229182	A1	2018-08-16	Olson, Edwin S., et al.		
	2	20180257030	A1	2018-09-13	Olson, Edwin S., et al.		
	3	20180257031	A1	2018-09-13	Olson, Edwin S., et al.		

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

Add

FOREIGN PATENT DOCUMENTS								Remove
Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14712558
	Filing Date		2015-05-14
	First Named Inventor	Edwin S. Olson	
	Art Unit	1776	
	Examiner Name	Amber Orlando	
	Attorney Docket Number	4820.001US7	

If you wish to add additional Foreign Patent Document citation information please click the Add button		Add
NON-PATENT LITERATURE DOCUMENTS		Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	"Application Serial No. 15 382,114, Response filed 09-12-18 to Restriction Requirement mailed 08-28-18", 8 pgs.	
	2	"Application Serial No. 15 589,359, Response filed 09-14-18 to Final Office Action mailed 09-12-18", 18 pgs.	
	3	"Application Serial No. 15 589,359, Final Office Action mailed 09-12-18", 14 pgs	
	4	"Application Serial No. 15 382,114, Restriction Requirement mailed 08-28-18", 9 pgs	
	5	"Application Serial No. 15 974,343, Response filed 08-14-18 to Non Final Office Action mailed 07-27-18", 11 pgs	
	6	"Application Serial No. 15 997,091, Response filed 08-14-2018 to Non Final Office Action mailed 07-27-18", 10 pgs	

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

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14712558
	Filing Date		2015-05-14
	First Named Inventor	Edwin S. Olson	
	Art Unit	1776	
	Examiner Name	Amber Orlando	
	Attorney Docket Number	4820.001US7	

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Nicholas P. Lanzatella/	Date (YYYY-MM-DD)	2018-09-25
Name/Print	Nicholas P. Lanzatella	Registration Number	63,803

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

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.

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Jordan Rivard Golomb/Jamie Johnson		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt	
EFS ID:	33825259
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Jordan Rivard Golomb/Jamie Johnson
Filer Authorized By:	Jordan Rivard Golomb
Attorney Docket Number:	4820.001US7
Receipt Date:	25-SEP-2018
Filing Date:	14-MAY-2015
Time Stamp:	17:38:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	092618INTEFSW00004830190743
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	Information Disclosure Statement (IDS) Form (SB08)	14712558_ids_09-25-2018.pdf	644410	no	4
			590236926aa209e2709a2e49f038e970b258a3ea		
Warnings:					
Information:					
2	Non Patent Literature	0001_2_npl_4820001u10_rsp_20180814_f.pdf	134044	no	10
			a79e0c92c26ad5f91f717ffb37f2b2e0000221dd		
Warnings:					
Information:					
3	Non Patent Literature	0002_2_npl_4820003us2_aarf_091418_f.pdf	151483	no	14
			5ac02bb1efacb06aa82f271d2ae9595b34dea4fd		
Warnings:					
Information:					
4	Non Patent Literature	0003_2_npl_4820003us2_foar_09122018_f.pdf	443891	no	14
			9146e30a1490ce584ec97b0be29ca099d4c9fbd9		
Warnings:					
Information:					
5	Non Patent Literature	0004_2_npl_4820004us1_rerr_08282018_f.pdf	321053	no	9
			0ac5b9d59e5935cb270900ea357fb76a28e06674		
Warnings:					
Information:					
6	Non Patent Literature	0005_2_npl_4820004us1_rrr1mo_091218_f.pdf	125678	no	8
			48aec36790b63d6001e1b2b80d1a0025aca4da0		
Warnings:					
Information:					

7	Non Patent Literature	0006_2_npl_4820_001us9_aar n_08142018_f.pdf	136050 4ff8e07c7fb94268ea8dbac16d0a52d318acff10	no	11
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	30555 bc73aba50beda3496ad9bc5f23d625e9c0c0ae15	no	2
Warnings:					
Information:					
Total Files Size (in bytes):				1987164	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	10/19/2018		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			10/19/2018	ELECTRONIC

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

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

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

SLW@blackhillsip.com
uspto@slwip.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

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 68 and 69 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claims 68 and 69 recites the limitation "the combustor" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

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

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or

nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

Claim 66-11 and 79-82 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 in view of Nelson Jr. US 2004/0003716 and Sing et al. US 4,699,896.

For claims 66 and 82, the Felsvang et al. reference discloses a method for treating a mercury-containing gas, the method comprising: combusting a mixture comprising coal (column 5, lines 23-25), and a promoter to form the mercury-containing gas (column 5, lines 60-65 and column 4, lines 42-45); and adding a particulate sorbent material comprising activated carbon into the mercury-containing gas (column 6, lines 11-14 and column 6, lines 24-26). The reference does not disclose pyrolysis char in the mixture and wherein the promoter comprises Br₂, HBr, Br¹, or a combination thereof.

It would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. reference to have the particulate sorbent material also in the mixture as the courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexcepted results. In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Further the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

The Sing et al. reference discloses that activated carbon is known to be made by pyrolysis to form desired porous active surface in carbonized fibrous material (char) (column 1, lines 14-20).

It would have been obvious to one having ordinary skill in the art to have modified Felsvang et al. to include the activated carbon (char) made by pyrolysis (which the examiner equates to pyrolysis char) as disclosed by Sing et al. (column 1, lines 14-20) in both or either of the mixture or after the boiler so as to form pores within the sorption material and therefore increase the specific surface area and its adsorption capacity.

The Nelson Jr. reference discloses the promoter comprises Br₂, HBr, Br', or a combination thereof (paragraphs [0017] and [0041]).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the promoter comprises Br₂, HBr, Br', or a combination thereof (Nelson Jr. paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

For claim 67, as the pyrolysis char and the promoter are together as shown by the combination of Felsvang, Nelson Jr. and Sing et al. above, this would result in the pyrolysis char being a promoted pyrolysis char that is promoted by the promoter.

For claims 68 and 69, the Felsvang et al. reference discloses the promoter is added prior to the combustor, within the combustor, or a combination thereof (column 4, lines 39-50).

For the same reasons as stated above it would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. to include the pyrolysis char is added prior to the combustor, within the combustor, or a combination thereof.

For claim 70, the Felsvang et al. reference discloses using a particle separation device to remove mercury from the flue gas (figure, objects 1, 2, 7 and 8) and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas (examples 1, 3 and 4).

For claim 71, the Felsvang et al. reference discloses the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising: monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level (column 6, lines 42-46).

For claim 72, the Felsvang et al. reference discloses the promoter is Br_2 , HBr , Br' , or a combination thereof (as shown above).

For claim 73, the Felsvang et al. reference discloses the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof (as shown above).

For claim 74, the Felsvang et al. reference discloses adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof (column 4, lines 25-28 and column 5, lines 26-32).

For claim 75, the Felsvang et al. reference does not explicitly state contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

The Nelson Jr. reference discloses that flue gas from coal fired power plants like that of Felsvang et al. including SO₂ (paragraph [0064]). Therefor Felsvang et al. discloses contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

For claims 76 and 77, the Felsvang et al. reference discloses contacting the sorbent material with a secondary' component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof (column 3, lines 53-55 and column 4, lines 93-50).

For claim 79, the Felsvang et al. reference discloses combusting coal in a combustor (boiler column 5, lines 23-26 and) comprising the mixture (as shown above). The further claim limitations are addressed above in claim 66.

For claim 80, the limitations have been addressed in claim 67 above.

For claim 81, the limitations are addressed above in claims 66, 67 and 69.

Claim 78 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980, Nelson Jr. US 2004/0003716 and Sing et al. US 4,699,896 as applied in claim 76 above and further in view of Srinivasachar US 6,848,374.

For claim 78, the Felsvang et al. reference does not disclose the secondary component is choses from I₂, HI, and combinations thereof.

The Srinivasachar reference discloses the secondary component is choses from I₂, HI, and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the secondary component is chosen from I₂, HI, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

Claims 66-11 and 79-82 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 in view of Nelson Jr. US 2004/0003716 and Wojtowizz US 6,103,205.

For claims 66 and 82, the Felsvang et al. reference discloses a method for treating a mercury-containing gas, the method comprising: combusting a mixture comprising coal (column 5, lines 23-25), and a promoter to form the mercury-containing gas (column 5, lines 60-65 and column 4, lines 42-45); and adding a particulate sorbent material comprising activated carbon into the mercury-containing gas (column 6, lines 11-14 and column 6, lines 24-26). The reference does not disclose pyrolysis char in the mixture and wherein the promoter comprises Br₂, HBr, Br', or a combination thereof.

It would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. reference to have the particulate sorbent material also in the mixture as the courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexcepted results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Further the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

The Wojtowizz reference discloses pyrolysis char can be a cost effective alternative to as an activated carbon for the absorption of mercury (column 3, lines 8-19).

It would have been obvious to one having ordinary skill in the art to have modified Felsvang et al. to include pyrolysis char as an addition or in place of other activated carbons (Wojtowizz column 3, lines 8-19) so as to provide a cost effective absorbent.

The Nelson Jr. reference discloses the promoter comprises Br₂, HBr, Br', or a combination thereof (paragraphs [0017] and [0041]).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the promoter comprises Br₂, HBr, Br', or a combination thereof (Nelson Jr. paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

For claim 67, as the pyrolysis char and the promoter are together as shown by the combination of Felsvang, Nelson Jr. and Wojtowizz above, this would result in the pyrolysis char being a promoted pyrolysis char that is promoted by the promoter.

For claims 68 and 69, the Felsvang et al. reference discloses the promoter is added prior to the combustor, within the combustor, or a combination thereof (column 4, lines 39-50).

For the same reasons as stated above it would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. to include the pyrolysis char is added prior to the combustor, within the combustor, or a combination thereof.

For claim 70, the Felsvang et al. reference discloses using a particle separation device to remove mercury from the flue gas (figure, objects 1, 2, 7 and 8) and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas (examples 1, 3 and 4).

For claim 71, the Felsvang et al. reference discloses the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising: monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level (column 6, lines 42-46).

For claim 72, the Felsvang et al. reference discloses the promoter is Br_2 , HBr , Br' , or a combination thereof (as shown above).

For claim 73, the Felsvang et al. reference discloses the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof (as shown above).

For claim 74, the Felsvang et al. reference discloses adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof (column 4, lines 25-28 and column 5, lines 26-32).

For claim 75, the Felsvang et al. reference does not explicitly state contacting the sorbent material with a mercury-stabilizing reagent chosen from S , Se , H_2S , SO_2 , H_2Se , SeO_2 , CS_2 , P_2S_5 , and combinations thereof.

The Nelson Jr. reference discloses that flue gas from coal fired power plants like that of Felsvang et al. including SO_2 (paragraph [0064]). Therefor Felsvang et al. discloses contacting the sorbent material with a mercury-stabilizing reagent chosen from S , Se , H_2S , SO_2 , H_2Se , SeO_2 , CS_2 , P_2S_5 , and combinations thereof.

For claims 76 and 77, the Felsvang et al. reference discloses contacting the sorbent material with a secondary' component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI , HBr , HCl , and combinations thereof (column 3, lines 53-55 and column 4, lines 93-50).

For claim 78, the Felsvang et al. reference does not disclose the secondary component is chosen from I_2 , HI , and combinations thereof.

The Srinivasachar reference discloses the secondary component is chosen from I_2 , HI , and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the secondary component is choses from I₂, HI, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

For claim 79, the Felsvang et al. reference discloses combusting coal in a combustor (boiler column 5, lines 23-26 and) comprising the mixture (as shown above). The further claim limitations are addressed above in claim 66.

For claim 80, the limitations have been addressed in claim 67 above.

For claim 81, the limitations are addressed above in claims 66, 67 and 69.

Claim 78 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980, Nelson Jr. US 2004/0003716 and Wojtowizz US 6,103,205 as applied in claim 76 above and further in view of Srinivasachar US 6,848,374.

For claim 78, the Felsvang et al. reference does not disclose the secondary component is choses from I₂, HI, and combinations thereof.

The Srinivasachar reference discloses the secondary component is choses from I₂, HI, and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the secondary component is choses from I₂, HI, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process...

may obtain a patent therefor..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the claims that are directed to the same invention so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claim 72 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 66. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the

reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. US 7,435,286 ('286) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '286 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '286 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-25 of U.S. Patent No. US 8,168,147 ('147) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '147 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '147 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,512,655 ('655) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '655 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '655 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,821,819 ('819) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '819 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '819 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-33 of U.S. Patent No. US 9,757,689 ('689) in view of Felsvang et al. US 5,435,980.

The current claim set corresponds to '689 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. reference disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '689 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. US 9,468,886 ('886) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '886 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '886 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. 8,652,235 ('235) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '235 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '235 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-16 of copending Application No. 15/295594 ('594) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '594 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '594 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 8-20 of copending Application No. 15/589359 ('359) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '359 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '359 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '029 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Feisvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. In *re* Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/978/760 ('760) in view of Feisvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '760 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Feisvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '760 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Feisvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/951970 ('970) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '970 except for combusting a mixture comprising coal, pyrolysis char.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '970 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/382114 ('114) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '114 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '114 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '029 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Response to Arguments

Applicant's arguments with respect to claims 66-82 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

<i>Notice of References Cited</i>	Application/Control No. 14/712,558		Applicant(s)/Patent Under Reexamination	
	Examiner AMBER R ORLANDO		Art Unit 1776	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5435980-A	07-1995	Felsvang; Karsten S.	B01D53/10	423/210
*	B	US-5569436-A	10-1996	Lerner; Bernard J.	B01D53/64	110/235
*	C	US-6136749-A	10-2000	Gadkaree; Kishor P.	B01D53/8665	502/180
*	D	US-6372187-B1	04-2002	Madden; Deborah A.	B01D53/508	110/345
*	E	US-6558454-B1	05-2003	Chang; Ramsay	B01D53/10	110/342
*	F	US-20040003716-A1	01-2004	Nelson, Sidney G. JR.	B01D53/02	95/134
*	G	US-6719828-B1	04-2004	Lovell; John S.	B01D53/02	423/210
*	H	US-20040086439-A1	05-2004	Vosteen, Bernhard	B01D53/64	423/210
*	I	US-6818043-B1	11-2004	Chang; Ramsay	B01D53/64	423/213.2
*	J	US-6848374-B2	02-2005	Srinivasachar; Srivats	B01D53/10	110/165R
*	K	US-20060048646-A1	03-2006	Olson; Edwin S.	B01D53/10	95/134
*	L	US-20070180990-A1	08-2007	Downs; William	B01D53/10	95/134
*	M	US-7514052-B2	04-2009	Lissianski; Vitali Victor	B01D53/56	423/210

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.

Notice of References Cited	Application/Control No. 14/712,558		Applicant(s)/Patent Under Reexamination	
	Examiner AMBER R ORLANDO		Art Unit 1776	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20090297413-A1	12-2009	Olson; Edwin S.	B01D53/10	423/215.5
*	B	US-20090320678-A1	12-2009	Chang; Ramsay	B01D46/002	95/92
*	C	US-7780765-B2	08-2010	Srinivasachar; Srivats	B01D53/10	110/203
*	D	US-20150098878-A1	04-2015	Olson; Edwin S.	B01J20/12	423/210
*	E	US-20170100692-A1	04-2017	Olson; Edwin S.	B01D53/08	1/1
*	F	US-20170239644-A1	08-2017	Olson; Edwin S.	B01D53/02	1/1
*	G	US-20180133646-A1	05-2018	Pavlish; John H.	B01J20/3416	1/1
*	H	US-20180257031-A1	09-2018	Olson; Edwin S.	B01J20/3416	1/1
*	I	US-4013516-A	03-1977	Greenfield; Charles	C10B47/30	159/905
*	J	US-4699896-A	10-1987	Sing; Kenneth S. W.	B01J21/18	264/29.2
*	K	US-6103205-A	08-2000	Wojtowicz; Marek A.	B01D53/04	423/210
	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. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	06/27/2017	AO

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
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	12/01/2017	AO
Inventor Search (DAV)	12/01/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	06/25/2018	AO
Text Search in EAST for sorbents added throughout the system and pyrolysis char (EAST).	10/16/2018	AO

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

<i>Search Notes</i> 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

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

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 4		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-2002/01505a1	10/17/2002	Pahiman, John E, et al.
	US-20030057293A1	3/27/2003	Boecking, Friedrich
	US-20070167309A1	7/19/2007	Olson, Edwin S.
	US-20090031708A1	2/5/2009	Schmidt, Darren D.
	US-2,456,272A1	2/7/2002	Pahiman, John, et al.
	US-3,341,185	9/12/1967	Kennedy, Sr, Walter L
	US-3,935,708	2/3/1976	Harrewijne, A., et al.
	US-4,342,192	8/3/1982	Heyn, K., et al.
	US-4,772,455	9/20/1988	Izumi, Kazuo, et al.
	US-4,956,162	9/11/1990	Smith, Wallace B, et al.
	US-5,480,619	1/2/1996	Johnson, Dennis, et al.
	US-5,500,306	3/19/1996	Hsu, M. S., et al.
	US-5,695,726	12/9/1997	Lerner, B J.
	US-6,001,762	12/14/1999	Harmer, Mark Andrew, et al.
	US-6,013,593	1/11/2000	Lee, Hoo-kun, et al.
	US-6,074,974	6/13/2000	Lee, Jung-min, et al.
	US-6,342,462	1/29/2002	Kulprathipanja, Santi
	US-6,475,451	11/5/2002	Leppin, Dennis, et al.
	US-6,576,585	6/10/2003	Fischer, Stefan, et al.
	US-6,579,507	6/17/2003	Pahlman, John, et al.
	US-6,596,661	7/22/2003	Neufert, Ronald
	US-6,610,263	8/26/2003	Pahlman, John, et al.
	US-7,017,330	3/28/2006	Bellows, James C.
	US-7,124,591	10/24/2006	Baer, Joan Mae, et al.
	US-7,247,279	7/24/2007	Pahlman, John, et al.
	US-7,293,414	11/13/2007	Huber, David J.
	US-7,435,286	10/14/2008	Olson, Edwin S., et al.
	US-7,442,239	10/28/2008	Armstrong, J. A., et al.
	US-8,080,088	12/20/2011	Srinivasachar, Srivats
	US-8,173,566	5/8/2012	Olson, Edwin S, et al.
	US-9,662,629	5/30/2017	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2327602A1	6/6/2001	Robles, Antonio	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 4	Attorney Docket No: 4820.001US7	

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CN-101053820A	10/17/2007	Geng, Jianming Qian	
	CN-101293196A	10/29/2008	Zhenglong, Yang	
	CN-101816922A	9/1/2010	Song, Hu, et al.	
	CN-102413899A	4/11/2012	Olson, Edwin S., et al.	
	CN-104519410A	4/15/2015	Olson, Edwin S., et al.	
	CN-104619410B	5/4/2016	Olson, Edwin S., et al.	
	CN-1048173A	1/2/1991	Guoguan, et al.	
	CN-105188910A	12/23/2015	Olson, Edwin S.	
	DE-3816600A1	11/23/1989	Kaizik, Alfred, Dr., et al.	
	EP-1458474	9/22/2004	Hammel, Charles F, et al.	
	JP-09256812	9/30/1997	Masanori, K., et al.	
	JP-544868A	1/13/1979	Seki, Michiharu, et al.	
	KR-1020027006149	7/2/2002	Tsuyoshi, O., et al.	
	WO-0228513A2	4/11/2002	Pahlman, John E, et al.	
	WO-03072241A1	9/4/2003	Hammel, Charles F, et al.	
	WO-2004094024A2	11/4/2004	Olson, Edwin, et al.	
	WO-2009018539A3	2/5/2009	Schmidt, Darren D.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1	
	"Application Serial No. 10/554,018 Response filed 11-01-10 to Final Office Action mailed 04-27-10", 17 pgs		
	"Application Serial No. 10/554,018, Final Office Action mailed 04-27-10", 8 pgs		
	"Application Serial No. 10/554,018, Non Final Office Action mailed 10-06-09", 8 pgs		
	"Application Serial No. 10/554,018, Notice of Allowance mailed 01-19-12", 7 pgs		
	"Application Serial No. 10/554,018, Response filed 02-08-10 to Non Final Office Action mailed 10-06-09", 9 pgs		
	"Application Serial No. 10/554,018, Response filed 08-10-09 to Restriction Requirement mailed 06-09-09", 1 pg		
	"Application Serial No. 10/554,018, Restriction Requirement mailed 06-09-09", 5 pgs		
	"Application Serial No. 12/184,860, Examiner Interview Summary mailed 04-05-11", 3 pgs		
	"Application Serial No. 12/184,860, Final Office Action mailed 05-11-11", 15 pgs		
	"Application Serial No. 12/184,860, Non Final Office Action mailed 01-19-11", 14 pgs		
	"Application Serial No. 12/184,860, Response filed 04-07-11 to Non Final Office Action mailed 01-19-11", 12 pgs		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 3 of 4	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 12/184,860, Response filed 07-08-11 to Final Office Action mailed 05-11-11", 11 pgs	
	"Application Serial No. 14/564,860, Final Office Action mailed 11-17-16", 4 pgs	
	"Application Serial No. 14/564,860, Non Final Office Action mailed 07-12-16", 6 pgs	
	"Application Serial No. 14/564,860, Notice of Allowance mailed 01-30-17", 6 pgs	
	"Application Serial No. 14/564,860, Preliminary Amendment filed 12-10-14", 8 pgs	
	"Application Serial No. 14/564,860, Response filed 05-06-16 to Restriction Requirement mailed 03-16-16", 9 pgs.	
	"Application Serial No. 14/564,860, Response filed 10-03-16 to Non Final Office Action mailed 07-12-16", 11 pgs	
	"Application Serial No. 14/564,860, Restriction Requirement mailed 03-16-16", 5 pgs	
	"Application Serial No. 15/452,527, Preliminary Amendment filed 03-08-17", 3 pgs.	
	"Application Serial No. PCT/US04/12828, International Search Report mailed 10/22/2004", 2 pgs	
	"Application Serial No. PCT/US2014/019916, International Preliminary Report on Patentability mailed 09-17-15", 14 pgs	
	"Canadian Application Serial No. 2,523,132, Office Action mailed 07-18-11", 3 pgs	
	"Canadian Application Serial No. 2,523,132, Response filed 01-16-12 to Office Action mailed 7-18-11", 5 pgs	
	"Canadian Application Serial No. 2,707,363, First Examiners Report Received 6/16/11", 2 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 02-26-16 to Office Action mailed 09-09-15", 13 pgs.	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 09-09-15", 3 pgs	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 12-22-16", 5 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 08-28-15 to Canadian Office Action mailed 04-02-15", 22 pgs	
	"Chinese Application Serial No. 200480017704.4, Office Action mailed 12-08-11", (w/ English Translation), 6 pgs	
	"Chinese Application Serial No. 200480017704.4, Response filed 01-20-12 to Office Action mailed 12-08-12", (w/ English Translation of Amended Claims), 10 pgs.	
	"Chinese Application Serial No. 201380033231.6, Office Action mailed 09-21-15", w/ Partial English Translation, 6 pgs	
	"Chinese Application Serial No. 201380033231.6, Response filed 01-14-16 to Office Action mailed 09-21-15", w/English Claims, 7 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 07-12-17", W/ English Translation, 8 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 07-25-16", (With English Translation), 4 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 4 of 4	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 12-23-16", 24 pgs.	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 12-23-16", W/ English Translation, 39 pgs	
	"Chinese Application Serial No. 201480025701.9, Response filed 09-15-17 to Office Action mailed 07-12-17", w/ English Translation, 21 pgs	
	"European Application Serial No. 13719338.9, Office Action mailed 05-12-17", 6 pgs	
	"European Application Serial No. 13719338.9, Office Action mailed 12-19-14", 2 pgs.	
	"European Application Serial No. 13719338.9, Response filed 06-29-15 to Office Action mailed 12-19-14", 19 pgs.	
	"European Application Serial No. 14711106.6, Communication Pursuant to Article 94(3) EPC mailed 02-22-17", 6 pgs	
	"European Application Serial No. 14711106.6, Response filed 08-17-17 to Communication Pursuant to Article 94(3) EPC mailed 02-22-17", 10 pgs	
	"International Application No. PCT/US2008/071986, International Search Report mailed 01-30-09", 3 pgs	
	OLSON, DAVID, et al., "The reduction of gas phase air toxics from combustion and incineration sources using the MET-Mitsui-BF activated coke process", Fuel Processing Technology, (2000), 13 pgs	
	STRENG, SABINE, et al., "Toxics control by activated charcoal within the "System Dusseldorf" full scale experience", B. Fuel Processing Technology, (1994), 14 pgs	
	TSUJI, K, et al., "The Activated Coke Process for Combined SOx/NOx/Air Toxics Reduction", Air and Water Management Assoc., (March 10, 1993), 27 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50

		sorbent and promoter and activated carbond and mercury				
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:18
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2016/09/29 16:22

		activated carbon	EPO; JPO; DERWENT; IBM_TDB			
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2016/11/16 11:06

			DERWENT; IBM_TDB			
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:28
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2016/11/16 11:32

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54
S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/11/16 15:23
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10,	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39

		B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"				
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787" "3194629" "3662523" "3786619" "3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323"	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20

		"5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.				
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31
S79	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
S80	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358" "6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41
S81	593	honeycomb with plug\$4 and plug\$4 with length	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S82	0	honeycomb with plug\$4 and plug\$4 with length with less than with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S83	0	honeycomb with plug\$4 and plug\$4 with length with less than	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S84	127	honeycomb with plug\$4 and plug\$4 with length with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:46
S85	241	honeycomb with plug\$4 and plug\$4 with length with mm	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:47
S86	41	honeycomb with plug\$4 and plug\$4 with	US-PGPUB;	ADJ	ON	2017/06/27

		length with "3 mm "	USPAT			14:49
S87	28	honeycomb with plug\$4 and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:52
S88	28	honeycomb and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:53
S89	43	honeycomb and plug\$4 with porosity with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:06
S90	20	honeycomb and plug\$4 with pore (size or diameter) with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:07
S91	8	saw with honeycomb with filter	US-PGPUB; USPAT	ADJ	ON	2017/06/29 13:31
S92	230	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/12/01 14:36
S93	2	"20060260468"	US-PGPUB; USPAT	ADJ	ON	2018/07/03 10:34
S94	19	engine with air with inlet with filter\$4 with cone	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:26
S95	36	engine with air with inlet with filter\$4 with (cone or conical or (diameter with (increas\$4 or decreas\$4)))	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:27
S96	24	("3771638" "3870495" "3872012" "4157902" "4702754" "5125940" "5522909" "5549724" "5632793").PN. OR ("5888260").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S97	41	("0153535" "0439091" "1398685" "1530163" "1887052" "2087688" "4003836" "4018580" "4032455" "4039308" "4065276" "4261710" "4410341" "4414110" "4699715" "5106397" "5178656" "5522909" "5549722" "5549724" "5888260" "6397842" "6508052" "D401597" "D401942" "D403414" "D403416").PN. OR ("6808552").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S98	15	("D403416").URPN.	USPAT	ADJ	ON	2018/07/03 15:33
S99	0	"20030089233"	USPAT	ADJ	ON	2018/07/04 12:29
S100	3	"20030089233"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S101	26	"6833023"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S102	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:08
S103	14	carbocations with sorbent with bromine	US-PGPUB; USPAT;	ADJ	ON	2018/07/09 13:14

			USOCR; FPRS; EPO; JPO			
S104	0	a side forming a cross sectional shape of each of the first	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:47
S105	0	non of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S106	0	none of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S107	0	none of sides forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S109	13	olson.in. and (alkali and promoter and earth).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S110	0	olson.in. and (alkali and promoter and earth with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S111	10	olson.in. and (alkali and promoter with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S112	0	"2015008283"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S113	2	"2015008283"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S114	24	olson.in. and liquid.clm. and promoted	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:50
S115	75	remov\$4 with mercury and (br or bromine) with liquid with carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:54
S116	0	separating greater than "70" wt% of the mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S117	0	((separating greater) with (of the mercury)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S118	20	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:43

S119	40	(during with after with mercury with sorbent)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:38
S120	304	sorbent with mercury and sorbent with boiler	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:39
S121	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:41
S122	18	before with burn\$4 with coal with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:42
S123	204	("0174348" "0202092" "0208011" "0224649" "0229159" "0298727" "0346765" "0347078" "0367014" "0537926" "0537998" "0541025" "0625754" "0647622" "0685719" "0688782" "0700888" "0744908" "0846338" "0894110" "0896876" "0911960" "0945331" "0945846" "1112547" "1167471" "1167472" "1183445" "1788466" "1984164" "20020065581" "20020114749" "20020184817" "20030088370" "20030103882" "20040003716" "20040013589" "20040086439" "20040219083" "20050039598" "20060047526" "20060210463" "2016821" "2059388" "2089599" "2511288" "3194629" "3288576" "3437476" "3599610" "3662523" "3725530" "3764496" "3823676" "3838190" "3849267" "3849537" "3956458" "3961020" "3974254" "4040802" "4075282" "4094777" "4101631" "4115518" "4148613" "4174373" "4196173" "4226601" "4233274" "4272250" "4280817" "4305726" "4322218" "4377599" "4387653" "4394354" "4440100" "4472278" "4474896" "4519807" "4519995" "4555392" "4582936" "4602918" "4629721" "4693731" "4716137" "4741278" "4758418" "4764219" "4786483" "4804521" "4807542" "4824441" "4830829" "4873930" "4886519" "4892567" "4915818" "4933158" "4936047" "4964889" "5013358" "5024171" "5049163" "5116793" "5126300" "5137854" "5162598" "5190566" "5238488" "5350728" "5368617" "5409522" "5435980" "5447703" "5460643" "5505746" "5505766" "5571490").PN. OR ("5587003"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/01 17:42

		"5618508" "5635150" "5659100" "5670122" "5733516" "5738834" "5787823" "5810910" "5897688" "5910292" "5989506" "6024931" "6083289" "6240859" "6258334" "6372187" "6375909" "6475451" "6521021" "6528030" "6533842" "6558454" "6610263" "6613110" "6719828" "6732055" "6737031" "6746531" "6790420" "6808692" "6848374" "6878358" "6942840" "6953494" "6962617" "6974564" "6975975" "7468170" "7507083" "7674442" "7758827" "7776301").PN.				
S124	1	"15573128"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:07
S125	2	"20110207597"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:08
S126	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S127	71	sorbent with before with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S128	234	"6953494"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:38
S129	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:40
S130	35	promoter with sorbent and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S131	28	promoter with sorbent with mercury and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S132	4	promoter with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:20
S133	4	promot\$4 with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:23

S134	4	promot\$4 with sorbent with mercury and pre.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:41
S135	2	promot\$4 with sorbent with mercury and pre-heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:42
S136	2	promot\$4 with sorbent with mercury and pre heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S137	57	promot\$4 with sorbent with mercury and pre	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S138	24	sorbent with preheat\$4 with coal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:39
S139	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:47
S140	23	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:28
S141	5	"14102896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:48
S142	7	"12429058"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:09
S143	4	"12202595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:23
S144	20	"12201595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:24
S145	3	"14564860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:27

S146	1	"15978760"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:28
S147	1	"15589359"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:32
S148	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:37
S149	8	"15997091"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S150	6	"14712558"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S151	2	"15951970"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:18
S152	4	"15382114"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:47
S153	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:51
S154	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:18
S155	69	"4279873"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:42
S156	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 07:59
S157	4	"15295594"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 08:08

S158	1	("20180257030").PN.	US-PGPUB; USPAT	ADJ	ON	2018/10/04 09:31
S159	86	"5569436"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:32
S160	6	"5785935"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S161	8	"6475471"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S162	53	"6103205"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:46
S163	0	pyrolysis with char with mercury with activated	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S164	17	pyrolysis with char with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S165	121	pyrolysis with char with activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S166	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S167	43	pyrolysis with char with activated carbon and mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S168	118	pyrolysis with char with tire	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S169	58	pyrolysis with char with activated carbon and mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S170	8	"20040081724"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2018/10/04 15:07

			FPRS; EPO; JPO			
S171	4	"14128179"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 15:10
S172	84	activat\$4 carbon with boiler with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S173	88	activat\$4 carbon with boiler with coal and (remov\$4 or filter\$4 or absorb\$4 or adsorb\$4) with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S174	0	mercury with stabiliz\$4 with sulfur dioxide	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 14:23
S175	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 15:07
S176	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:48
S177	17	"8821819"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:51
S178	15	"8652235"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:55

10/16/2018 8:40:48 AM

C:\Users\amillerharris\Documents\EAST\Workspaces\12429058.wsp

Receipt date: 09/25/2018

14/712,558 - GAU: 1776

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

Approved for use through 07/31/2012. OMB 0851-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	14712558
	Filing Date	2015-05-14
	First Named Inventor	Edwin S. Olson
	Art Unit	1776
	Examiner Name	Amber Orlando
	Attorney Docket Number	4820.001US7

U.S.PATENTS							Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1						

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

Add

U.S.PATENT APPLICATION PUBLICATIONS							Remove
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1	20180229182	A1	2018-08-16	Olson, Edwin S., et al.		
	2	20180257030	A1	2018-09-13	Olson, Edwin S., et al.		
	3	20180257031	A1	2018-09-13	Olson, Edwin S., et al.		

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

Add

FOREIGN PATENT DOCUMENTS								Remove
Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							

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

Application Number	14712558
Filing Date	2015-05-14
First Named Inventor	Edwin S. Olson
Art Unit	1776
Examiner Name	Amber Orlando
Attorney Docket Number	4820.001US7

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

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	"Application Serial No. 15 382,114, Response filed 09-12-18 to Restriction Requirement mailed 08-28-18", 8 pgs.	
	2	"Application Serial No. 15 589,359, Response filed 09-14-18 to Final Office Action mailed 09-12-18", 18 pgs.	
	3	"Application Serial No. 15 589,359, Final Office Action mailed 09-12-18", 14 pgs	
	4	"Application Serial No. 15 382,114, Restriction Requirement mailed 08-28-18", 9 pgs	
	5	"Application Serial No. 15 974,343, Response filed 08-14-18 to Non Final Office Action mailed 07-27-18", 11 pgs	
	6	"Application Serial No. 15 997,091,Response filed 08-14-2018 to Non Final Office Action mailed 07-27-18", 10 pgs	

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

EXAMINER SIGNATURE

Examiner Signature	/AMBER R ORLANDO/	Date Considered	10/15/2018

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

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

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

Application Number	14712558
Filing Date	2015-05-14
First Named Inventor	Edwin S. Olson
Art Unit	1776
Examiner Name	Amber Orlando
Attorney Docket Number	4820.001US7

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Nicholas P. Lanzatella/	Date (YYYY-MM-DD)	2018-09-25
Name/Print	Nicholas P. Lanzatella	Registration Number	63,803

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

/AMBER R ORLANDO/

10/15/2018

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.

/A.R.O/

10/15/2018

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/295,594, Response filed 07-03-18 to Restriction Requirement mailed 05-22-18", 9 pgs.	
	"Application Serial No. 15/295,594, Response filed 07-24-18 to Restriction Requirement mailed 06-29-18", 9 pgs.	
	"Application Serial No. 15/295,594, Restriction Requirement mailed 06-29-18", 5 pgs	
	"Application Serial No. 15/449,112, Notice of Allowance mailed 07-12-18", 8 pgs	
	"Application Serial No. 15/589,359, Response filed 07-26-18 to Non Final Office Action mailed 06-04-18", 14 pgs.	
	"Application Serial No. 15/974,343, Non Final Office Action mailed 07-27-18", 12 pgs	
	"Application Serial No. 15/978,760, Response filed 07-13-18 to Non Final Office Action mailed 06-29-18", 12 pgs	
	"Application Serial No. 15/978,760, Non Final Office Action mailed 06-29-18", 9 pgs	
	"Application Serial No. 15/997,091, Non Final Office Action mailed 07-27-18", 13 pgs	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 04-24-18", 4 pgs	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 08-31-17", 4 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 02-26-18 to Office Action mailed 08-31-17", w/ Amended Claims, 53 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 06-21-17 to Office Action mailed 12-22-16", 41 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 01-16-18", (English Translation), 8 pgs	
	"Chinese Application Serial No. 201480025701.9, Response filed 03-27-18 to Office Action mailed 01-16-18", w/ English Claims, 20 pgs	
	"DATABASE WPI Week 197450", Thomson Scientific, London, GB; AN 1974-86199V XP002514926	
	"European Application Serial No. 13719338.9, Notification Regarding Rule 164 and Article 94(3) EPC mailed 04-24-17", 8 pgs	
	"Response filed 09-04-17 to Notification Regarding Rule 164 and Article 94(3) EPC mailed 04-24-17", 7 pgs	
	"Supplementary European Search Report, dated December 6, 2012", 2 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O./

A/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Application No. 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.111

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

Applicant has received the Non-Final Office Action dated October 19, 2018. Please enter the following.

IN THE CLAIMS

Please amend the claims as follows:

1.-65. (Canceled)

66. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises $[[Br_2,]]$ HBr, Br⁻, or a combination thereof; and adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

67. (Previously Presented) The method of claim 66, wherein the pyrolysis char is a promoted pyrolysis char that is promoted by the promoter.

68. (Currently Amended) The method of claim 66, wherein the pyrolysis char and the promoter are added prior to $[[the]]$ a combustor that combusts the mixture, within the combustor, or a combination thereof.

69. (Currently Amended) The method of claim 66, wherein the pyrolysis char and the promoter are added within $[[the]]$ a combustor that combusts the mixture.

70. (Previously Presented) The method of claim 66, further comprising using a particle separation device to remove mercury from the flue gas and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas.

71. (Previously Presented) The method of claim 70, wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising: monitoring the mercury content of the cleaned gas; and

controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level.

72. (Currently Amended) The method of claim 66, wherein the promoter ~~[[is]]~~further comprises ~~Br₂, HBr, Br⁻, or a combination thereof.~~

73. (Previously Presented) The method of claim 66, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

74. (Previously Presented) The method of claim 66, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

75. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

76. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

77. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

78. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

79. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor comprising pyrolysis char and a promoter, to form the mercury-containing gas, wherein the promoter comprises $[[Br_2,]][HBr, Br^-]$, or a combination thereof;

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

80. (Previously Presented) The method of claim 79, wherein the pyrolysis char is a promoted pyrolysis char that has been promoted by the promoter.

81. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor and adding within the combustor a pyrolysis char promoted by a promoter, to form the mercury-containing gas, wherein the promoter comprises $[[Br_2,]][HBr, Br^-]$, or a combination thereof; and

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

82. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and a promoter, to form the mercury-containing gas, wherein the promoter comprises $[[Br_2,]][HBr, Br^-]$, or a combination thereof; and

adding a sorbent material comprising activated carbon into the mercury-containing gas.

REMARKS

This responds to the Non-Final Office Action dated October 19, 2018.

Claims 66, 68-69, 72, 79, 81, and 82 are presently amended. No claims are presently canceled, and claims 1-65 were canceled previously. No new claims are presently added. As a result, claims 66-82 are now pending in this application.

Independent claim 66 is presently amended to recite "...wherein the promoter comprises $[\text{Br}_2, \text{HBr}, \text{Br}^-]$, or a combination thereof..."

Claim 72 is presently amended to recite "...wherein the promoter ~~[[is]]~~further comprises $\text{Br}_2, \text{HBr}, \text{Br}^-$, or a combination thereof."

No new matter is added via the amendments herein.

Objections

I. The Office Action objected to claim 72 under 37 CFR 1.75 for the stated reason of being a substantial duplicate of claim 66.

This objection is respectfully traversed. Prior claim 72 recites that the promoter is $\text{Br}_2, \text{HBr}, \text{Br}^-$, or a combination thereof, whereas prior claim 66 recites that the promoter **comprises** $\text{Br}_2, \text{HBr}, \text{Br}^-$, or a combination thereof. Prior claim 66 therefore can include other species in the promoter other than the recited species, whereas prior claim 72 only includes the recited species in the promoter.

Nonetheless, not conceding that prior claim 72 is a substantial duplicate of prior claim 66, and merely to expedite prosecution, claim 66 is presently amended to recite "...wherein the promoter comprises $[\text{Br}_2, \text{HBr}, \text{Br}^-]$, or a combination thereof..." and claim 72 is presently amended to recite "...wherein the promoter ~~is~~mixture further comprises $\text{Br}_2, \text{HBr}, \text{Br}^-$, or a combination thereof."

Applicant therefore respectfully requests reconsideration and withdrawal of the objection to claim 72 under 37 CFR 1.75.

The Rejection of Claims Under §112

II. The Office Action rejected claims 68 and 69 under 35 U.S.C. § 112(b) or 35 U.S.C. § 112 (pre-AIA), second paragraph, as allegedly being indefinite.

The Office Action states that claims 68 and 69 recite the limitation “the combustor” in line 2, and there is insufficient antecedent basis for this limitation in the claim.

This rejection is respectfully traversed.

Claim 68 and 69 are presently amended to recite “... prior to [[the]]a combustor that combusts the mixture...”

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 68 and 69 under 35 U.S.C. § 112(b) or 35 U.S.C. § 112 (pre-AIA), second paragraph.

The Rejection of Claims Under §103

III. The Office Action rejected claims 66-71 and 79-82 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 (“Felsvang”) in view of U.S. patent application no. 2004/0003716 (“Nelson”) and U.S. patent no. 4,699,896 (“Sing”).

This rejection is respectfully traversed.

As explained herein at **III(A)**, there would be no motivation for a person of ordinary skill in the art to use Nelson’s bromide additives in Felsvang’s process. As explained herein at **III(B)(1)**, in-flight promotion with bromide promoters is more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas, and as explained herein at **III(B)(2)**, there would be no way for a person of ordinary skill in the art to predict this advantage from the cited references. As explained herein at **III(C)(1)**, in-flight promotion with bromide promoters is more effective for mercury removal than in-flight promotion with chloride-promoters, and as explained herein at **III(C)(2)**, there would be no way for a person of ordinary skill in the art to predict this advantage from the cited references. As explained herein at **III(D)**, even if a person of ordinary skill in the art compared the mercury removal of Felsvang’s activated carbons promoted with chloride in the flue gas to activated carbons treated with HCl outside of the flue gas, they would not determine that in-flight promotion provides the same or better mercury removal properties. As explained herein at **III(E)**, Sing fails to remedy the defects of Nelson and Felsvang.

III(A). There would be no motivation for a person of ordinary skill in the art to use Nelson’s bromide additives in Felsvang’s process.

Independent claims 66, 79, 81, and 82 are presently amended to recite "...wherein the promoter comprises [Br_2 , HBr , $\text{Br}^\cdot$, or a combination thereof...."

The Office Action admits that Felsvang fails to describe or suggest a halogen or halide promoter that is Br_2 , HBr , or $\text{Br}^\cdot$. Nelson fails to describe or suggest in-flight promotion of activated carbon with a halide in the flue gas. The Office Action alleges that one of ordinary skill in the art would combine Nelson's additive with Felsvang's method to accomplish the presently claimed method, stating that such a modification of Felsvang would be made "...to promote activated carbon (Nelson paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury." (Office Action, page 4, last sentence of second to last full paragraph). Applicant respectfully disagrees. As explained below, a person of ordinary skill in the art would not be motivated to use Nelson's bromide additives in Felsvang's process.

Felsvang is directed to adding chlorine (Cl_2) or chloride ($\text{Cl}^\cdot$) materials to the coal or combustion products. Felsvang makes clear that addition of chlorine or chloride material increases the amount of chloride supplied to the flue gas, or to the drying-absorption zone, see, Abstract and col. 3, lines 40-44. When Felsvang mentions activated carbon, the interaction between activated carbon and chloride is the focus: "[i]t has been experienced that the increase of the Hg-removing effect of chloride addition to the drying-absorption zone in a process treating flue gases of low chloride content is especially remarkable when activated carbon is present...." Col. 3, line 67 bridging to col. 4, line 4. For a person of ordinary skill in the art to be motivated to replace Felsvang's chloride-treatment with treatment by another material to provide an effective carbon sorbent for mercury, that person would need to think that the material they are using to replace the chloride would result in the same or better mercury-removal efficiency. However, not only does Felsvang fail to describe or suggest that in-flight promotion of activated carbon with chloride provides better mercury removal than treatment of activated carbon outside the flue gas with chloride; further, as shown herein at **III(D)**, treatment of activated carbon outside the flue gas with chloride actually provides better mercury removal than in-flight promotion of activated carbon with chloride, which would lead one of ordinary skill in the art away from using in-flight promotion.

Nelson's Background paragraph [0017] states that "[t]he particular advantages of using bromine rather than iodine or iodides, or chlorine or chlorides, with activated carbons for mercury control have not been previously appreciated." The paragraph then goes on to describe various

accomplishments in the prior art, stating that prior art processes fail to use bromine as a sequestration agent on carbon, and concludes with “[r]ather, it serves as a catalyst, taking part in a repeated series of desired chemical reactions, but not becoming permanently consumed by any of them. Perhaps it is understandable that the tenacity of carbon-bromine-mercury complexes could be overlooked.” Importantly, paragraph [0017] states that bromine (Br_2) is superior to I_2 or I^- , or Cl_2 or Cl^- , with activated carbons for sequestration, and never states that the claimed promoters HBr or Br^- are more effective with activated carbons than chlorides.

Nelson’s paragraph [0041] states:

[0041] I have discovered that the simple act of exposing a carbonaceous material, preferably powdered activated carbon (PAC), to gaseous bromine, $\text{Br}_2(\text{g})$, or to gaseous hydrogen bromide, $\text{HBr}(\text{g})$, significantly increases the carbonaceous material’s ability to remove mercury species when injected into high-temperature coal-fired flue-gas compositions. Surprisingly, gaseous bromine produces a much more effective and appropriate carbon sorbent for mercury in hot combustion gases than do iodine or iodide species, or chlorine or chloride species, in contrast to what has been taught in the prior art.

Paragraph [0041] begins by stating that bromine, defined as Br_2 , or hydrogen bromide, defined as HBr , increases the mercury absorption capacity of activated carbon. Then, paragraph [0041] states specifically that bromine (Br_2) produces a more effective mercury-absorbing carbon sorbent than iodine (I_2), or iodide (I^-), or chlorine (Cl_2), or chloride (Cl^-). With the precise definitions given for bromine and hydrogen bromide, and then reference only to bromine, Nelson makes clear that the comparison of efficacy is only with respect to bromine and not hydrogen bromide. Like paragraph [0017], paragraph [0041] also fails to state that HBr or Br^- are more effective with activated carbons than chlorides.

The majority of Nelson’s Examples (1-4 and 8) focus only on Br_2 . Nelson’s Examples 5-7 demonstrate the use of HBr -treated sorbent; however, none of these Examples or any other parts of Nelson compare the mercury-absorption performance of HBr -treated activated carbon to chloride-treated activated carbon such as HCl -treated activated carbon. Although figures 14 and 15 illustrate HBr -treated activated carbon and Cl_2 -treated activated carbon, Cl_2 -treated activated carbon is not

chloride-treated carbon and these figures fail to show any examples of chloride-treated activated carbon.

Nelson's paragraph [0049] states:

[0049] A critical element in the process is that a bromine-containing gas **3** is used to treat the carbonaceous substrate. Preferably this gas comprises elemental bromine, Br₂(g), although other bromine-containing gases, such as hydrogen bromide, HBr, will also have the advantageous effect of the invention.

Paragraph [0049] says that using Br₂ is a critical element of the process. It states that HBr can also have the "advantageous effect of the invention"; however, it is not clear what advantage this is referring to. The very next paragraph, [0050], states "[i]n the liquid form at ambient temperatures, elemental bromine is dense and compact, with advantages in transport and storage." These statements also hold true for HBr in the form of a gas. No Example is given in Nelson comparing the mercury-absorption performance of activated carbons treated with bromides such as HBr to the mercury-absorption performance of chlorides such as HCl. In every statement comparing to other halogens or halides, Nelson states with great particularity, even giving the chemical formula, that bromine (Br₂) has advantageous effects over other halogens and halides but fails to mention bromides in these statements. One of ordinary skill in the art would not interpret paragraph [0049] or any other part of Nelson as describing or suggesting that bromides even have the same effectiveness for mercury sequestration when used to treat activated carbons as chlorides, let alone that bromides are more effective for mercury sequestration when used to treat activated carbons than chlorides or chlorine.

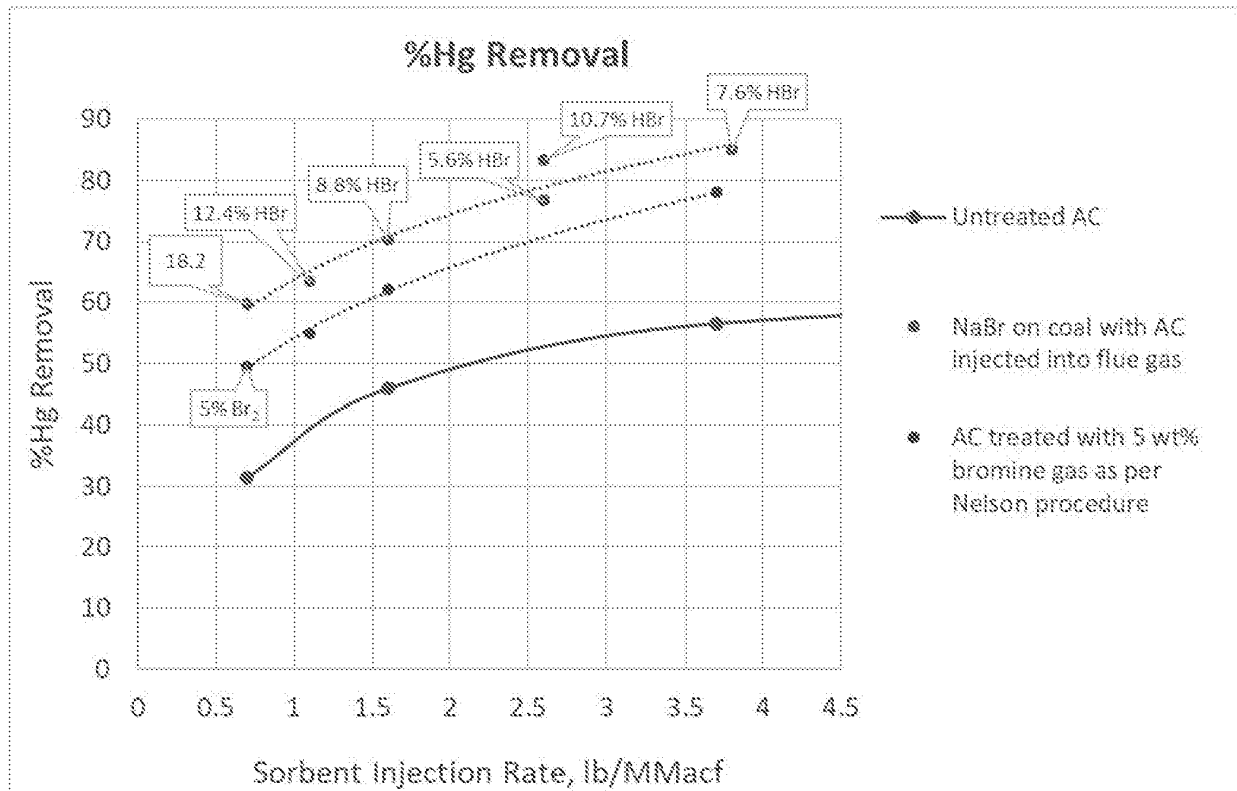
Nelson fails to describe or suggest that treatment of activated carbon with bromides such as HBr could provide any mercury-removal improvement, or even the same mercury-removal activity, compared to activated carbons treated with chlorides. Not only does Felsvang fail to describe or suggest that in-flight promotion of activated carbon with chloride provides better mercury removal than treatment of activated carbon outside the flue gas with chloride; further, as shown herein at **III(D)**, treatment of activated carbon outside the flue gas with chloride actually provides better mercury removal than in-flight promotion of activated carbon with chloride, which would lead one of ordinary skill in the art away from using in-flight promotion. A person of ordinary skill in the art would have no reason to modify Felsvang's chloride process with a different promoter to form an

effective carbon sorbent for mercury if the resulting mercury-removal efficiency could not be reasonably predicted to be the same or greater as that of Felsvang's original process. Therefore, a person of ordinary skill in the art would not be motivated to combine Nelson's bromide additive with Felsvang's chloride method. Independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Sing for at least this reason.

III(B)(1). In-flight promotion with bromide promoters is more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas.

The inventors of the present application have discovered that by combusting coal in the presence of a bromide promoter, and by placing an activated carbon sorbent in the mercury-containing gas, as presently claimed, the activated carbon can be promoted by the promoter in-flight in the mercury-containing gas, and further, that in-flight bromide promotion of the activated carbon is more effective for mercury removal than use of an activated carbon that is treated with bromides or bromine outside the flue gas.

As explained in the 37 CFR § 1.132 declaration by John Pavlish filed with the Non-Final Office Action Response for Application No. 15/978,760 on December 3, 2018 ("132 Declaration"), pilot-scale testing was performed with activated carbon alone (untreated) injected into the flue gas, the activated carbon treated with Br₂ outside the flue gas as per the Nelson procedure (see, 132 Declaration at item 6), and with NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. The same activated carbon was used for each sample. See, the 132 Declaration at items 8-11. The plot given in the 132 Declaration at item 11 is reproduced below.



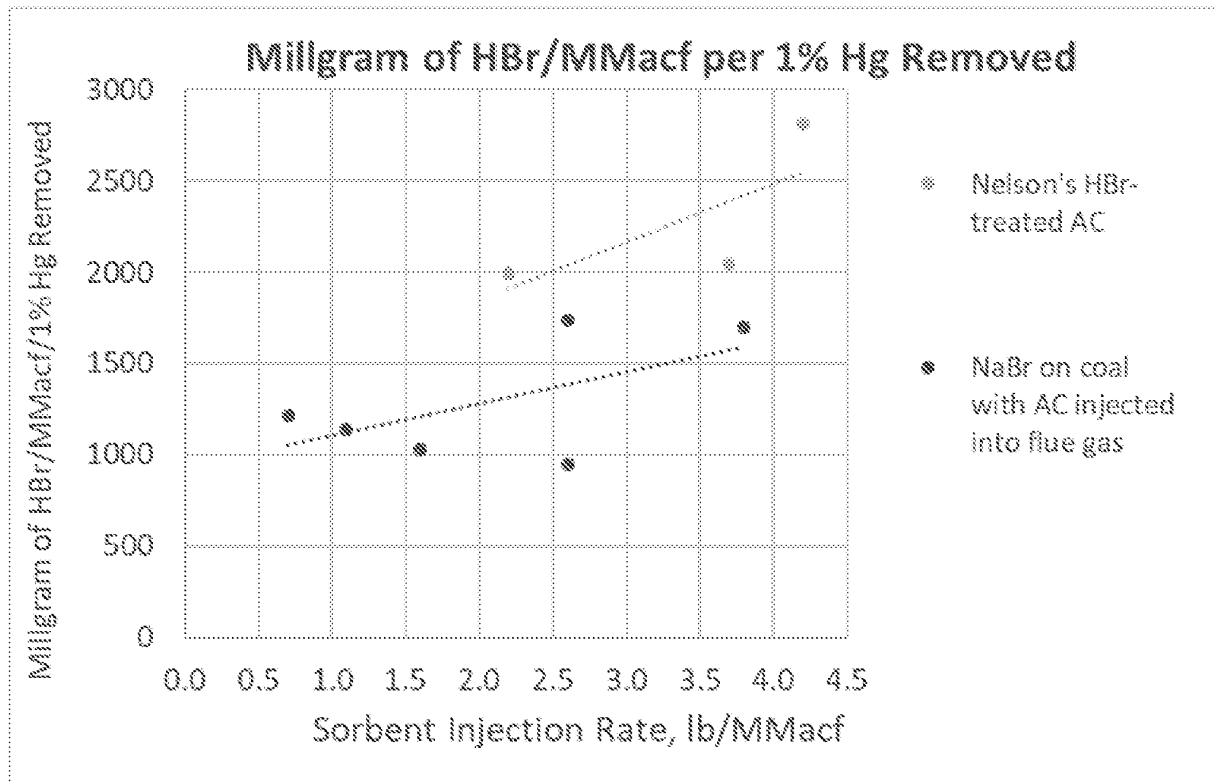
The data in the plot above from item 11 of the 132 Declaration show that the NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas (in-flight promotion with Br^-) provided a higher percent of mercury removal at all tested sorbent injection rates as compared to the activated carbon alone (untreated) and compared to the activated carbon treated with Br_2 outside the flue gas described herein at item 6 as per the Nelson procedure. With NaBr added to the coal and activated carbon injected into the flue gas, there was a significant reduction in the amount of sorbent required to achieve similar mercury removal compared to the activated carbon treated with Br_2 outside the flue gas. For example, to achieve 70% mercury removal, 2.5 lb/MMacf of Br_2 -treated carbon was required, as compared to 1.6 lb/MMacf with NaBr added to the coal and activated carbon injected into the flue gas; an additional $(2.5 - 1.6 / 1.6) * 100\%$ or 56% treated sorbent was required to achieve the same level of mercury removal. See, 132 Declaration at items 2-5 and 12.

The percent mercury removal per 1 wt% HBr versus the sorbent injection rate was compared with NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas using the pilot-scale plant, and with Nelson's activated carbon treated with HBr outside the flue gas. The data for Nelson's activated carbon treated with HBr outside the flue gas was taken directly from Nelson. The first plot given in the 132 Declaration at item 13 is reproduced below, but only showing the bromide data.



The data in the plot above, derived from the first plot at item 13 of the 132 Declaration, show that the NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas provided a significantly higher (about 2x) percent mercury removal per 1 wt% HBr at all tested sorbent injection rates as compared to Nelson's activated carbon treated with HBr outside the flue gas. See, 132 Declaration at item 14.

The data from the pilot-scale plant was also plotted to show the milligrams of HBr/MMacf per 1% mercury removal versus the sorbent injection rate with NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas, and for Nelson's activated carbon treated with HBr outside the flue gas. The second plot given in the 132 Declaration at item 13 is reproduced below.



The data in the plot above, derived from the second plot at item 13 of the 132 Declaration, show that NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas provided a significantly lower milligrams of HBr/MMacf per 1% mercury removal at all tested sorbent injection rates as compared to Nelson's activated carbon treated with HBr outside the flue gas, indicating more efficient (approximately 2x) use of HBr for mercury removal during in-flight promotion of activated carbon than treatment of activated carbon outside the flue gas. See, 132 Declaration at item 14.

III(B)(2). There is no way a person of ordinary skill in the art could predict from the cited references that in-flight promotion of a sorbent with bromide promoters is more effective for mercury removal than use of a sorbent that is treated with the same promoters outside the flue gas.

The M.P.E.P. at the beginning of § 2143.02 states (emphasis added) “[a] rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, *and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.*”

As admitted by the Office Action, Felsvang fails to describe or suggest bromide promoters. Felsvang also fails to describe or suggest that treatment of an activated carbon with a chloride additive outside of flue gas has any advantages over in-flight promotion of an activated carbon with a chloride promoter. Further, as shown herein at **III(D)**, treatment of activated carbon outside the flue gas with chloride provides better mercury removal than in-flight promotion of activated carbon with chloride. Therefore, a person of ordinary skill in the art hypothetically having Felsvang in-hand would have no clue that in-flight promotion of activated carbon with a halide could give the same or better percent mercury removal over halide treatment outside of the flue gas, and would be led away from Felsvang’s in-flight process if they investigated the relative mercury removal of treatment of the activated carbon with chloride outside the flue gas versus in-flight treatment with chloride in the flue gas.

Nelson mentions treating activated carbon outside of flue gas, and then adding the activated carbon to flue gas. Nelson fails to describe or suggest in-flight promotion of an activated carbon with a halide in the flue gas. Therefore, a person of ordinary skill in the art hypothetically having Nelson in-hand would also have no idea that in-flight promotion of activated carbon with a halide could have any advantages over halide treatment outside of the flue gas.

There is no way to predict from the presently cited references the superior mercury capture discovered by the present inventors that occurs when activated carbon is promoted with bromide promoters in-flight in the mercury-containing gas, as occurs when following the present claims. The Office Action states at the end of the second to last full paragraph on page 4 that Nelson’s additives would be combined with Felsvang’s in-flight promotion “...so as to provide an effective carbon sorbent for mercury.” However, a person of ordinary skill in the art would have no idea that

in-flight promotion with bromide promoters could work better than Nelson's bromide-treatment outside the flue gas. Felsvang fails to describe or suggest that in-flight promotion provides a sorbent with even the same (let alone superior) properties as a sorbent treated outside the flue gas, and, as explained herein at **II(D)**, treatment of activated carbon outside the flue gas with chloride actually provides better mercury removal than in-flight promotion of activated carbon with chloride; similarly, Nelson fails to describe in-flight promotion, let alone that in-flight promotion provides the same or superior mercury removal ability as compared to treatment outside the flue gas.

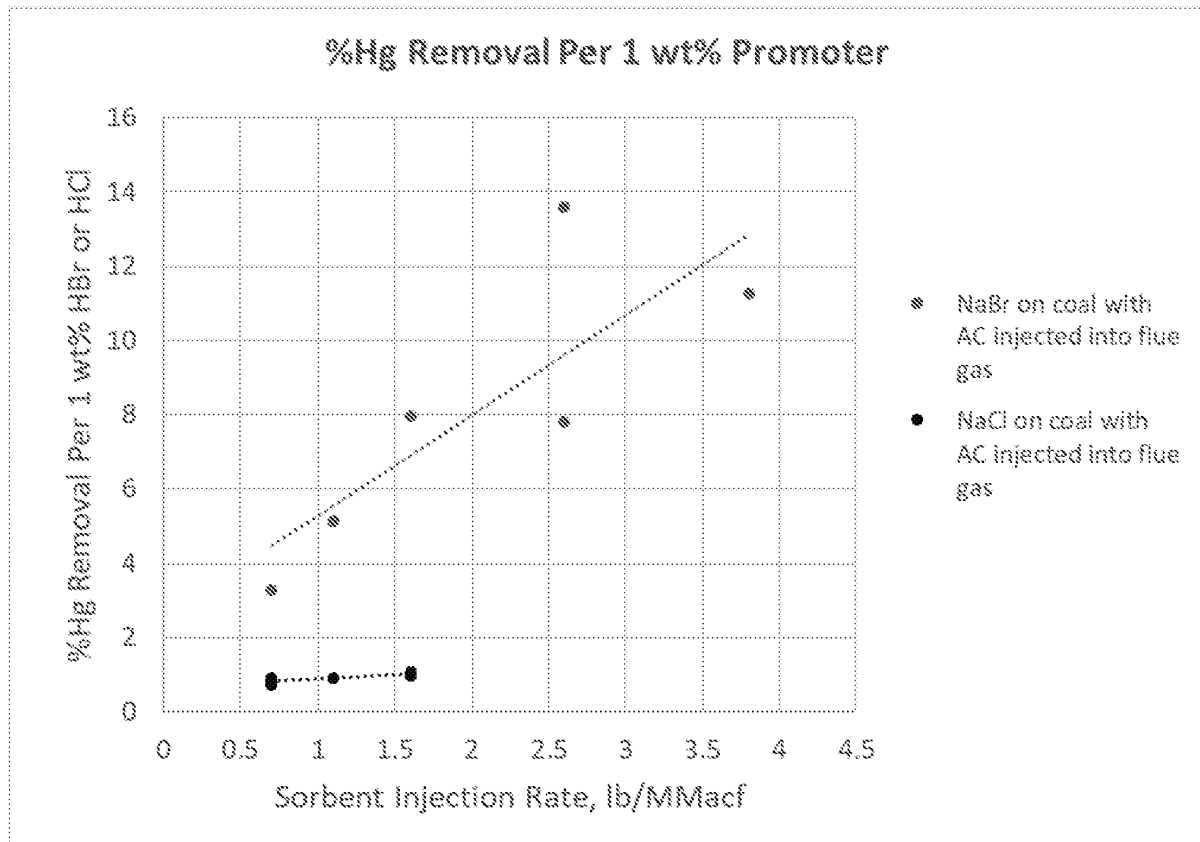
The only way that a person of ordinary skill in the art could discover that in-flight promotion of activated carbon with bromide promoters is more effective for mercury removal than bromide treatment outside the flue gas would not be from the cited references alone; instead, the person of ordinary skill would need to actually modify Felsvang with Nelson as alleged, and then to compare the mercury removal of Felsvang's modified process to Nelson's sorbent treated outside the flue gas.¹ However, the person of ordinary skill carrying out such a combination would be surprised to find that in-flight promotion with bromide is more effective for mercury removal than bromide treatment of the sorbent outside the flue gas. The process giving rise to these surprising results was discovered by the inventors of the present application. Surprising results are a hallmark of patentability; only by having the present application in-hand could such results be predicted, and a need to resort to hindsight analysis to predict the advantages of the combination asserted by the Office Action is indicative that the presently claimed invention is not obvious over the cited references. Accordingly, independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Sing for at least this additional reason.

III(C)(1). In-flight promotion with bromide promoters is more effective for mercury removal than in-flight promotion with chloride-promoters.

The inventors of the present application have discovered that that in-flight bromide promotion of an activated carbon in a mercury-containing flue gas is significantly more effective for mercury removal than in-flight chloride promotion of an activated carbon.

¹ In the event the Examiner intends to argue that such advantages are inherent in the cited art, Applicant notes that the claimed invention is not specifically disclosed in the prior art. The Examiner cannot reason inherency in a §103 context based on a mere proposed or hypothetical combination of features from cited references. Such reasoning would merely reflect the Examiner's reliance on impermissible hindsight. See, M.P.E.P. § 2112(IV).

As explained in the 132 Declaration, pilot-scale testing was performed with NaBr or NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. The same activated carbon was used for each sample. See, the 132 Declaration at items 8-10. The first plot given in the 132 Declaration at item 13 is reproduced below, but not showing the data from Nelson's HBr-treated AC.



The data in the plot above, derived from the first plot at item 13 of the 132 Declaration, show that the NaBr added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas provided a significantly higher (about 6-8x) percent mercury removal per 1 wt% HBr or HCl at all tested sorbent injection rates compared to the NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. See, 132 Declaration at item 14.

II(C)(2). There would be no way for a person of ordinary skill in the art to predict this advantage from the from the cited references.

As explained herein at **III(A)**, Nelson fails to describe or suggest that treatment of activated carbon with bromides such as HBr could provide any mercury-removal improvement, or even the same mercury-removal activity, compared to Felsvang's activated carbons promoted with chlorides.

The only way that a person of ordinary skill in the art could discover that in-flight promotion with bromide promoters is more effective for mercury removal than in-flight promotion with chloride promoters would not be from the cited references alone; instead, the person of ordinary skill would need to actually modify Felsvang with Nelson as alleged, and then to compare the mercury removal of Felsvang's modified process to Felsvang's original process.² However, the person of ordinary skill carrying out such a combination would be surprised to find that promotion of activated carbon with bromides such as HBr could provide any mercury-removal improvement, or even the same mercury-removal activity, compared to Felsvang's activated carbons promoted with chlorides. The process giving rise to these surprising results was discovered by the inventors of the present application. Surprising results are a hallmark of patentability; only by having the present application in-hand could such results be predicted, and a need to resort to hindsight analysis to predict the advantages of the combination asserted by the Office Action is indicative that the presently claimed invention is not obvious over the cited references. Accordingly, independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Sing for at least this additional reason.

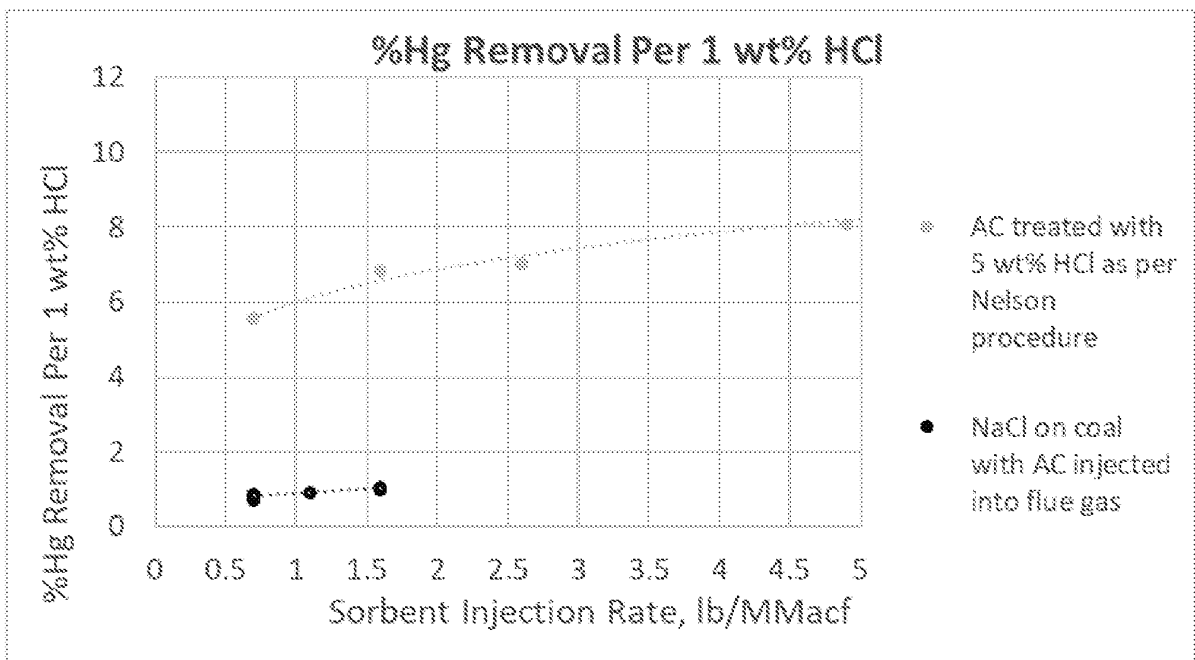
III(D). Even if a person of ordinary skill in the art compared the mercury removal of Felsvang's activated carbons promoted with chloride in the flue gas to activated carbons treated with HCl outside of the flue gas, they would not determine that in-flight promotion provides the same or better mercury removal properties.

As explained herein at **III(A)**, Felsvang fails to describe or suggest that in-flight promotion of activated carbon with chloride provides better mercury removal than treatment of activated

² In the event the Examiner intends to argue that such advantages are inherent in the cited art, Applicant notes that the claimed invention is not specifically disclosed in the prior art. The Examiner cannot reason inherency in a §103 context based on a mere proposed or hypothetical combination of features from cited references. Such reasoning would merely reflect the Examiner's reliance on impermissible hindsight. See, M.P.E.P. § 2112(IV).

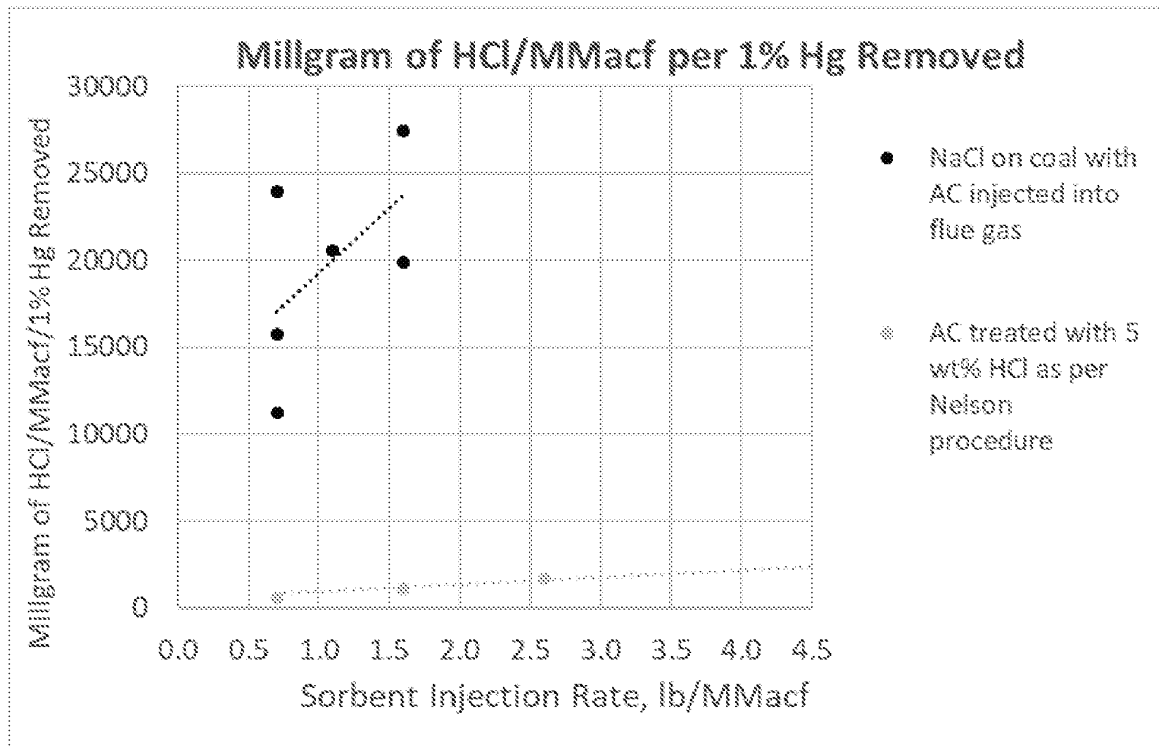
carbon outside of the flue gas. For the sake of argument, even if a person of ordinary skill in the art were to compare mercury removal of Felsvang's activated carbons promoted with chloride in the flue gas to activated carbons treated with HCl outside of the flue gas, they would not find that in-flight promotion provides the same or better mercury-removal properties.

As explained in the 132 Declaration, pilot-scale testing was performed with activated carbon treated with HCl outside the flue gas as per the Nelson procedure (see, 132 Declaration at item 7), and with NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. The same activated carbon was used for each sample. See, the 132 Declaration at items 8-10. The first plot given in the 132 Declaration at item 15 is reproduced below.



The data in the plot above from the item 15 of the 132 Declaration show that activated carbon treated with HCl outside the flue gas as per the Nelson procedure provided a much higher percent of mercury removal per 1 wt% HCl at all tested sorbent injection rates as compared to NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. See, 132 Declaration at item 16.

The pilot-scale data was also plotted to show the milligrams of HCl/MMacf per 1% mercury removal versus the sorbent injection rate with NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas, and for the activated carbon treated with HCl outside the flue gas described herein at item 7 as per the Nelson procedure. The second plot given in the 132 Declaration at item 15 is reproduced below.



The data in the second plot above from item 15 of the Declaration show that the milligrams of HCl/MMacf per 1% mercury removal versus the sorbent injection rate with NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas was significantly higher as compared to the activated carbon treated with HCl outside the flue gas described herein at item 7 as per the Nelson procedure, indicating more efficient use of HCl for mercury removal by treatment of activated carbon outside the flue gas than by promotion in-flight.

III(E). Sing fails to remedy the defects of Nelson and Felsvang.

Sing is toward methods of preparing fibrous activated carbons by carbonizing and activated cellulose fiber. Sing fails to describe or suggest mercury removal. Sing fails to describe or suggest treatment of activated carbon with halogens or halides. As such, Sing fails to remedy the defects of Felsvang and Nelson described herein at **III(A)-III(E)**; therefore, independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Sing.

Dependent claims 67-78 and 80 are directly or indirectly dependent on independent claims 66 or 79. As such, these dependent claims incorporate all the features of claims 66 or 79. Accordingly, claims 67-78 and 80 are patentable for at least the reasons given herein for patentability of independent claims 66 or 79.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 66-71 and 79-82 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson and Sing.

IV. The Office Action rejected claim 78 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 (“Felsvang”) in view of U.S. patent application no. 2004/0003716 (“Nelson”), U.S. patent no. 4,699,896 (“Sing”), and U.S. patent no. 6,848,374 (“Srinivasachar”).

This rejection is respectfully traversed.

Independent claim 66 is presently amended to recite “...wherein the promoter comprises $[[Br_2,]HBr, Br^-]$, or a combination thereof...”

As explained herein at **III**, independent claim 66 is patentable over Felsvang, Nelson, and Sing. Srinivasachar mentions treating activated carbon with halide salts or halogen acids prior to placing the activated carbon into flue gas. See, col. 6, lines 2-20. However, like Nelson, Srinivasachar fails to describe or suggest promotion of activated carbon in flue gas, and also fails to describe or suggest that HBr or Br^- have the same or greater effectiveness for mercury removal when used to treat activated carbons than chlorides. Accordingly, there would be no motivation for a person of ordinary skill in the art to use Srinivasachar’s or Nelson’s bromide additives in Felsvang’s process. Further, there is no way to determine from Srinivasachar that in-flight promotion with bromide promoters is more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas (as explained herein at **III(B)(1)**), or that in-flight promotion with bromide promoters is more effective for mercury

removal than in-flight promotion with chloride-promoters (as explained herein at **III(C)(1)**). Additionally, even if a person of ordinary skill in the art compared the mercury removal of Felsvang's activated carbons promoted with chloride in the flue gas to activated carbons treated with HCl outside of the flue gas as used in Nelson and Srinivasachar, they would not determine that in-flight promotion provides the same or better mercury removal properties, as explained herein at **III(D)**. As such, Srinivasachar fails to remedy the deficiencies of Felsvang, Nelson, and Sing. Therefore, independent claim 66 is patentable over Felsvang in view of Nelson, Sing, and Srinivasachar.

Dependent claim 78 is indirectly dependent on independent claim 66. As such, this dependent claim incorporates all the features of claim 66. Accordingly, dependent claim 78 is patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 78 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson, Sing, and Srinivasachar.

V. The Office Action rejected claims 66-71 and 79-82 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 ("Felsvang") in view of U.S. patent application no. 2004/0003716 ("Nelson") and U.S. 6,103,205 ("Wojtowicz").

This rejection is respectfully traversed.

Independent claims 66, 79, 81, and 82 are presently amended to recite "...wherein the promoter comprises [[Br₂,]HBr, Br⁻, or a combination thereof..."

As explained herein at **III**, independent claims 66, 79, 81, and 82 are patentable over Felsvang and Nelson. Wojtowicz is toward removal of mercury from a gas using activated carbon formed from pyrolysis char. Wojtowicz fails to describe or suggest treatment of activated carbon with a halogen or halide outside the flue gas, and also fails to describe or suggest in-flight promotion of activated carbon with a halogen or halide in the flue gas. As such, Wojtowicz fails to remedy the defects of Felsvang and Nelson described herein at **III(A)-III(E)**; therefore, independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Wojtowicz.

Dependent claims 67-78 and 80 are directly or indirectly dependent on independent claims 66 or 79. As such, these dependent claims incorporate all the features of claims 66 or 79.

Accordingly, claims 67-78 and 80 are patentable for at least the reasons given herein for patentability of independent claims 66 or 79.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 66-71 and 79-82 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson and Wojtowicz.

VI. The Office Action rejected claim 78 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 ("Felsvang") in view of U.S. patent application no. 2004/0003716 ("Nelson"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 6,848,374 ("Srinivasachar").

This rejection is respectfully traversed.

Independent claims 66 is presently amended to recite "...wherein the promoter comprises [[Br₂,]HBr, Br⁻, or a combination thereof..."

As explained herein at V, independent claim 66 is patentable over Felsvang, Nelson, and Wojtowicz. As explained herein at IV, like Wojtowicz, Srinivasachar also fails to remedy the deficiencies of Felsvang and Nelson; therefore, independent claim 66 is patentable over Felsvang in view of Nelson, Wojtowicz, and Srinivasachar.

Dependent claim 78 is indirectly dependent on independent claim 66. As such, this dependent claim incorporates all the features of claim 66. Accordingly, dependent claim 78 is patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 78 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson, Wojtowicz, and Srinivasachar.

Double Patenting Rejections

VII(A). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-30 of U.S. patent no. 7,435,286 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-30 of U.S. patent no. 7,435,286 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time

inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(B). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-25 of U.S. patent no. 8,168,147 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-25 of U.S. patent no. 8,168,147 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(C). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-60 of U.S. patent no. 8,512,655 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-60 of U.S. patent no. 8,512,655 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(D). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. patent no. 8,821,819 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-60 of U.S. patent no. 8,821,819 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time

inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(E). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-33 of U.S. patent no. 9,757,689 in view of U.S. patent no. 5,435,980 ("Felsvang").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-33 of U.S. patent no. 9,757,689 in view of Felsvang.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(F). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of U.S. patent no. 9,468,886 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of U.S. patent no. 9,468,886 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(G). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. patent no. 8,652,235 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-30 of U.S. patent no. 8,652,235 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time

inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(H). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-16 of copending application no. 15/295,594 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-16 of copending application no. 15/295,594 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(I). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 8-20 of copending application no. 15/589,359 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 8-20 of copending application no. 15/589,359 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(J). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/853,029 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/853,029 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(K). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/978,760 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/978,760 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(L). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending application no. 15/951,970 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/951,970 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(M). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/382,114 in view of U.S. patent no. 5,435,980 (“Felsvang”), U.S. 6,103,205 (“Wojtowicz”), and U.S. patent no. 4,699,896 (“Sing”).

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/382,114 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VII(N). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending Application No. 15/853,029 in view of U.S. patent no. 5,435,980 (“Felsvang”), U.S. 6,103,205 (“Wojtowicz”), and U.S. patent no. 4,699,896 (“Sing”).

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending Application No. 15/853,029 in view of Felsvang, Wojtowicz and Sing. This rejection appears to be a duplicate of the rejection listed herein at VII(J).

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date December 3, 2018

By Nicholas P. Lanzatella

Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

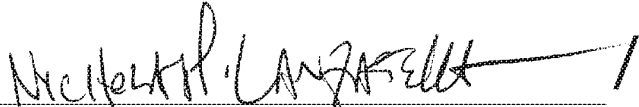
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date December 3, 2018

By


Nicholas P. Lanzatella
Reg. No. 63,803

NPL:mlr1

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,130,930	11/20/2018	Olson, Edwin S
	US-20180280870A1	10/4/2018	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/295,594, Non Final Office Action mailed 10-23-18", 20 pgs	
	"Application Serial No. 15/589,359, Non Final Office Action mailed 10-22-18", 12 pgs	
	"Application Serial No. 15/974,343, Non Final Office Action mailed 10-29-18", 22 pgs	
	"Application Serial No. 15/978,760, Non Final Office Action mailed 10-10-18", 17 pgs	
	"Application Serial No. 15/997,091, Non Final Office Action mailed 11-02-18", 27 pgs	
	PIETRZAK, et al., "Preparation of nitrogen-enriched activated carbons from brown coal", Energy and Fuels 20.3, (2006), 1275-1280	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Steven M. Reid/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt	
EFS ID:	34470854
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Steven M. Reid/Megan Reed
Filer Authorized By:	Steven M. Reid
Attorney Docket Number:	4820.001US7
Receipt Date:	03-DEC-2018
Filing Date:	14-MAY-2015
Time Stamp:	18:21:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	120418INTEFSW00005474190743
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		SIGNED_4820_001US7_NFOAR espSIDS.pdf	886619	yes	32
			2a5c34a2b8cc61c9312f15e614f2519f0ac8a901		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	1	
	Amendment/Req. Reconsideration-After Non-Final Reject		2	2	
	Claims		3	5	
	Applicant Arguments/Remarks Made in an Amendment		6	29	
	Transmittal Letter		30	31	
	Information Disclosure Statement (IDS) Form (SB08)		32	32	
Warnings:					
Information:					
2	Non Patent Literature	4820003US2_OARN_10222018.pdf	365706	no	12
			04e432309be34468b0d3a780fe19ed102451f716		
Warnings:					
Information:					
3	Non Patent Literature	Pietrzak_PreparationofNitrogen.pdf	88096	no	6
			65fd1916f62064c9b79a50875761157e9cf0897f		
Warnings:					
Information:					
4	Non Patent Literature	4820001U10_OARNPE_11022018.pdf	2761437	no	27
			fb862fcee6b16fc7490e07aa49c9e65050baac7b		

Warnings:					
Information:					
5	Non Patent Literature	4820001US9_OARNPE_10292018.pdf	2276933 ac21acccc9755c0c4cf8b431cf843e6c3eb50e43	no	22
Warnings:					
Information:					
6	Non Patent Literature	4820007US3_OARN_10232018.pdf	2099174 911fd90bd66ab2b63bd84aedeacb1fd08f4ef8c9	no	20
Warnings:					
Information:					
7	Non Patent Literature	4820007US4_OARNPE_10102018.pdf	1857201 f0f35f142b1545dfb0f67d85862e0505390a38a5	no	17
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	30119 92826b40a0b5de444ce228c0f911c0399e68b3ae	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			10365285		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: January 19, 2019

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

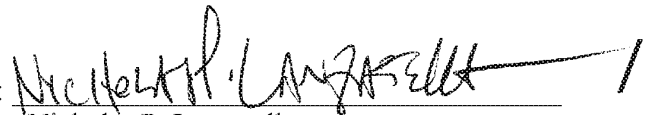
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Amendment and Response under 37 C.F.R. § 1.111 (28 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (6).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 
Nicholas P. Lanzatella
Reg. No. 63,803

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (l), 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 \$80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x \$420 =	
☐ 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)	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	12/03/2018		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	17	Minus	** 20	= 0
	Independent (37 CFR 1.16(h))	*	4	Minus	*** 4	= 0
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						0
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*		Minus	**	=
	Independent (37 CFR 1.16(h))	*		Minus	***	=
	☐ 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.						SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/ALA H HUNTER/
*** 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.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	01/11/2019		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			01/11/2019	ELECTRONIC

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

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

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

SLW@blackhillsip.com
uspto@slwip.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Claim Rejections - 35 USC § 103

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

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the

contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

Claim 66-77 and 79-82 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 in view of Nelson Jr. US 2004/0003716 and Sing et al. US 4,699,896.

For claims 66 and 82, the Felsvang et al. reference discloses a method for treating a mercury-containing gas, the method comprising: combusting a mixture comprising coal (column 5, lines 23-25), and a promoter to form the mercury-containing gas (column 5, lines 60-65 and column 4, lines 42-45); and adding a particulate sorbent material comprising activated carbon into the mercury-containing gas (column 6, lines 11-14 and column 6, lines 24-26). The reference does not disclose pyrolysis char in the mixture and wherein the promoter comprises HBr, Br', or a combination thereof.

It would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. reference to have the particulate sorbent material also in the mixture as the courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexcepted results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Further the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

The Sing et al. reference discloses that activated carbon is known to be made by pyrolysis to form desired porous active surface in carbonized fibrous material (char) (column 1, lines 14-20).

It would have been obvious to one having ordinary skill in the art to have modified Felsvang et al. to include the activated carbon (char) made by pyrolysis (which the examiner equates to pyrolysis char) as disclosed by Sing et al. (column 1, lines 14-20) in both or either of the mixture or after the boiler

so as to form pores within the sorption material and therefore increase the specific surface area and its adsorption capacity.

The Nelson Jr. reference discloses the promoter comprises HBr, Br', or a combination thereof (paragraphs [0017] and [0041]).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the promoter comprises HBr, Br', or a combination thereof (Nelson Jr. paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

For claim 67, as the pyrolysis char and the promoter are together as shown by the combination of Felsvang, Nelson Jr. and Sing et al. above, this would result in the pyrolysis char being a promoted pyrolysis char that is promoted by the promoter.

For claims 68 and 69, the Felsvang et al. reference discloses the promoter is added prior to a combustor, within the combustor, or a combination thereof (column 4, lines 39-50).

For the same reasons as stated above it would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. to include the pyrolysis char is added prior to the combustor, within the combustor, or a combination thereof.

For claim 70, the Felsvang et al. reference discloses using a particle separation device to remove mercury from the flue gas (figure, objects 1, 2, 7 and 8) and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas (examples 1, 3 and 4).

For claim 71, the Felsvang et al. reference discloses the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising: monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent

composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level (column 6, lines 42-46).

For claim 72, the Nelson reference discloses the promoter further comprises Br_2 (paragraphs [0017] and [0041]).

For claim 73, the Felsing et al. reference discloses the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof (as shown above).

For claim 74, the Felsing et al. reference discloses adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof (column 4, lines 25-28 and column 5, lines 26-32).

For claim 75, the Felsing et al. reference does not explicitly state contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H_2S , SO_2 , H_2Se , SeO_2 , CS_2 , P_2S_5 , and combinations thereof.

The Nelson Jr. reference discloses that flue gas from coal fired power plants like that of Felsing et al. including SO_2 (paragraph [0064]). Therefore Felsing et al. discloses contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H_2S , SO_2 , H_2Se , SeO_2 , CS_2 , P_2S_5 , and combinations thereof.

For claims 76 and 77, the Felsing et al. reference discloses contacting the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof (column 3, lines 53-55 and column 4, lines 93-50).

For claim 79, the Felsvang et al. reference discloses combusting coal in a combustor (boiler column 5, lines 23-26 and) comprising the mixture (as shown above). The further claim limitations are addressed above in claim 66.

For claim 80, the limitations have been addressed in claim 67 above.

For claim 81, the limitations are addressed above in claims 66, 67 and 69.

Claim 78 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980, Nelson Jr. US 2004/0003716 and Sing et al. US 4,699,896 as applied in claim 76 above and further in view of Srinivasachar US 6,848,374.

For claim 78, the Felsvang et al. reference does not disclose the secondary component is chosen from I₂, HI, and combinations thereof.

The Srinivasachar reference discloses the secondary component is chosen from I₂, HI, and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the secondary component is chosen from I₂, HI, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

Claims 66-77 and 79-82 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 in view of Nelson Jr. US 2004/0003716 and Wojtowicz US 6,103,205.

For claims 66 and 82, the Felsvang et al. reference discloses a method for treating a mercury-containing gas, the method comprising: combusting a mixture comprising coal (column 5, lines 23-25), and a promoter to form the mercury-containing gas (column 5, lines 60-65 and column 4, lines 42-45); and adding a particulate sorbent material comprising activated carbon into the mercury-containing gas (column 6, lines 11-14 and column 6, lines 24-26). The reference does not disclose pyrolysis char in the mixture and wherein the promoter comprises Br₂, HBr, Br', or a combination thereof.

It would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. reference to have the particulate sorbent material also in the mixture as the courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexcepted results. In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Further the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

The Wojtowizz reference discloses pyrolysis char can be a cost effective alternative to as an activated carbon for the absorption of mercury (column 3, lines 8-19).

It would have been obvious to one having ordinary skill in the art to have modified Felsvang et al. to include pyrolysis char as an addition or in place of other activated carbons (Wojtowizz column 3, lines 8-19) so as to provide a cost effective absorbent.

The Nelson Jr. reference discloses the promoter comprises HBr, Br', or a combination thereof (paragraphs [0017] and [0041]).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the promoter comprises HBr, Br', or a combination thereof (Nelson Jr. paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

For claim 67, as the pyrolysis char and the promoter are together as shown by the combination of Felsvang, Nelson Jr. and Wojtowizz above, this would result in the pyrolysis char being a promoted pyrolysis char that is promoted by the promoter.

For claims 68 and 69, the Felsvang et al. reference discloses the promoter is added prior to the combustor, within the combustor, or a combination thereof (column 4, lines 39-50).

For the same reasons as stated above it would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. to include the pyrolysis char is added prior to the combustor, within the combustor, or a combination thereof.

For claim 70, the Felsvang et al. reference discloses using a particle separation device to remove mercury from the flue gas (figure, objects 1, 2, 7 and 8) and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas (examples 1, 3 and 4).

For claim 71, the Felsvang et al. reference discloses the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising: monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that the mercury content of the cleaned gas is maintained at or below the desired level (column 6, lines 42-46).

For claim 72, the Nelson reference discloses the promoter further comprises Br_2 (as paragraphs [0017] and [0041]).

For claim 73, the Felsvang et al. reference discloses the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof (as shown above).

For claim 74, the Felsvang et al. reference discloses adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof (column 4, lines 25-28 and column 5, lines 26-32).

For claim 75, the Felsvang et al. reference does not explicitly state contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H_2S , SO_2 , H_2Se , SeO_2 , CS_2 , P_2S_5 , and combinations thereof.

The Nelson Jr. reference discloses that flue gas from coal fired power plants like that of Felsvang et al. including SO₂ (paragraph [0064]). Therefor Felsvang et al. discloses contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

For claims 76 and 77, the Felsvang et al. reference discloses contacting the sorbent material with a secondary' component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof and the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof (column 3, lines 53-55 and column 4, lines 93-50).

For claim 78, the Felsvang et al. reference does not disclose the secondary component is choses from I₂, HI, and combinations thereof.

The Srinivasachar reference discloses the secondary component is choses from I₂, HI, and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include the secondary component is choses from I₂, HI, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

For claim 79, the Felsvang et al. reference discloses combusting coal in a combustor (boiler column 5, lines 23-26 and) comprising the mixture (as shown above). The further claim limitations are addressed above in claim 66.

For claim 80, the limitations have been addressed in claim 67 above.

For claim 81, the limitations are addressed above in claims 66, 67 and 69.

Claim 78 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980, Nelson Jr. US 2004/0003716 and Wojtowizz US 6,103,205 as applied in claim 76 above and further in view of Srinivasachar US 6,848,374.

For claim 78, the Felsing et al. reference does not disclose the secondary component is chosen from I₂, HI, and combinations thereof.

The Srinivasachar reference discloses the secondary component is chosen from I₂, HI, and combinations thereof (column 6, lines 2-20).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsing et al. reference to include the secondary component is chosen from I₂, HI, and combinations thereof (Srinivasachar column 6, lines 2-20) so as to significantly improve the sorbents performance.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research

agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(I)(1) - 706.02(I)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. US 7,435,286 ('286) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '286 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '286 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA

1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-25 of U.S. Patent No. US 8,168,147 ('147) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '147 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '147 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,512,655 ('655) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '655 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '655 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,821,819 ('819) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '819 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '819 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA

1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-33 of U.S. Patent No. US 9,757,689 ('689) in view of Felsvang et al. US 5,435,980.

The current claim set corresponds to '689 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. reference disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '689 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. US 9,468,886 ('886) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '886 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '886 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. 8,652,235 ('235) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '235 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '235 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same

function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-16 of copending Application No. 15/295594 ('594) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '594 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '594 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 8-20 of copending Application No. 15/589359 ('359) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '359 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '359 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '029 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so

as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/978/760 ('760) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '760 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '760 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same

function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/951970 ('970) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '970 except for combusting a mixture comprising coal, pyrolysis char.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '970 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/382114 ('114) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '114 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '114 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-82 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '029 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Feisvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. In *re* Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Response to Arguments

Applicant's arguments filed 12/03/2018 have been fully considered but they are not persuasive.

I. The objections of claim 72 has been overcome by the claim amendment.

II. The 112 rejection of claims 68-69 have been overcome by the claim amendment.

The applicant traverses the combination of Felsvang and Nelson combination stating that there is no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process. The applicant contends that one having ordinary skill in the art would not be motivated to replace Felsvang's chloride-treatment with treatment by another material as the prior art does not disclose the bromide additives performing the same or better mercury-removal efficiency.

The examiner disagrees. See Fig. 14 of Nelson which shows that about 3 times the amount of chlorine treated PAC was required to achieve the same degree of mercury removal as with bromine. (paragraph [0085]). Also see the absorption rate in the table on page 8. Further as the rejection above

states. Both chlorine and bromine are known within the art to treat activated carbon and therefore it would be well within the capability of one having ordinary skill in the art to *either replace the Cl with or include in addition to* the halogen or halide promoter comprising HBr, Br⁻, or a combination thereof to promote activated carbon (Nelson paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

The applicant contends that the Nelson reference does not disclose HBr and Br⁻ being more effect with activated carbons than chlorides.

The examiner disagrees. The Nelson reference discloses that HBr is used to provide bromide to the system. Example 5, paragraph [0083] states that the brominated PACs were treated with HBr or Br₂. Figures 14 and 15 disclose that HBr treated PAC performs better than chlorine treated PAC. Further one having ordinary skill in the art would expect PAC treated with HBr or Br₂ would result in a very similar modified PAC as they both include bromide (see paragraph [0092] which discloses that each of the brominated PACs performed similarly). The examiner also points to paragraph [0087] of Nelson which discloses that PAC adsorption of gaseous hydrogen bromide being ten times faster than it was for chlorine.

The applicant contends that the bromide promoters are more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas. The applicant further provides a graph to demonstrate these unexpected results.

These unexpected results are not commensurate with the scope of the claims. The applicant is claiming HBr and Br⁻ while the graph only demonstrates HBr. Further the comparisons between the prior art and that of the current invention do not demonstrate unexpected results. The applicant's data is unclear as it is either HBr (as specified in the actual graph) or NaBr (as specified in the legend). Further the 18.2 data point has no labeling on what the promoter is. None of the data points include what amount is being specified, wt%, vol% etc. The results would be expected by one having ordinary skill in

the art as the wt% (if we are to assume the amount specified is wt) of the amount supported on the upper most line is greater than that of the wt% on the middle trending line. Further claim 1 does not include NaBr on coal. Lastly is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods.

The second graph on page 12 comparing NaBr on coal to HBr treated AC and it is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods. To do that the graph would have to be comparing HBr in the present method to HBr is the prior art method. Further the applicant has not shown the amount of promoter supported by each (wt%) data point. Lastly claim 1 does not include NaBr on coal.

The third graph on page 13 compares HBr treated AC and NaBr on coal with AC injected into flue gas. The graph states Milligram of HBr/MMacF/1%Hg Removed. As HBr is not a part of the current application data points it is unclear how to interpret this graph. Claim 1 does not include NaBr on coal. Further is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods.

The applicant contends that there is no way a person of ordinary skill in the art could predict from the cited references that in-flight promotion of a sorbent with bromide promoters is more effective for mercury removal.

The examiner contends that the applicant has not established that in-flight promotion of a sorbent with bromide promoters is more effective for mercury removal by providing factual evidence of such.

The applicant contends that one having ordinary skill in the art would not have predicted in-flight chloride promotion of activated carbon to be more effective for mercury removal than in-flight chloride promotion.

The examiner disagrees. Nelson discloses that bromide is a better promoter of AC for the purpose of mercury removal as shown above. Therefore one having ordinary skill in the art would expect an in-flight bromide promoted sorbent to be superior to an in-flight chloride promoted sorbent.

The applicant argues that one having ordinary skill in the art would not predict this advantage from the cited references.

The examiner disagrees for the reasons stated above.

The applicant contends that "Even if a person of ordinary skill in the art compared the mercury removal of Felsing's activated carbons promoted with Chloride in the flue gas to activated carbon treated with HCl outside of the flue gas, they would not determine that in-flight promotion provides the same or better mercury removal properties".

This appears to be merely conjecture by the applicant as no factual evidence has been presented.

The graphs on pages 18 and 19, have NaCl compared to HCl. It is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods. Further the examiner points to the y-axis which has HCl which is not included in one set (NaCl) of the data points so it is unclear how the data points are being obtained.

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 AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

Application/Control Number: 14/712,558
Art Unit: 1776

Page 26

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

***/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776***

Search Notes 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	06/27/2017	AO

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
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	12/01/2017	AO
Inventor Search (DAV)	12/01/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	06/25/2018	AO
Text Search in EAST for sorbents added throughout the system and pyrolysis char (EAST).	10/16/2018	AO
IDS Search (EAST and DAV)	01/07/2019	AO
EAST Text Search	01/07/2019	AO

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

<i>Search Notes</i> 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

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

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1	Attorney Docket No: 4820.001US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,130,930	11/20/2018	Olson, Edwin S
	US-20180280870A1	10/4/2018	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/295,594, Non Final Office Action mailed 10-23-18", 20 pgs	
	"Application Serial No. 15/589,359, Non Final Office Action mailed 10-22-18", 12 pgs	
	"Application Serial No. 15/974,343, Non Final Office Action mailed 10-29-18", 22 pgs	
	"Application Serial No. 15/978,760, Non Final Office Action mailed 10-10-18", 17 pgs	
	"Application Serial No. 15/997,091, Non Final Office Action mailed 11-02-18", 27 pgs	
	PIETRZAK, et al., "Preparation of nitrogen-enriched activated carbons from brown coal", Energy and Fuels 20.3, (2006), 1275-1280	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 01/07/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/01/07 09:41
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602,	US-PGPUB;	ADJ	ON	2015/03/17

		B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	USPAT			13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2016/09/29 16:18

			IBM_TDB			
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:22
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05

S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2016/11/16 11:28

			DERWENT; IBM_TDB			
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54
S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602,	US-PGPUB;	ADJ	ON	2016/11/16

		B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	USPAT			15:23
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787"	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20

		"3194629" "3662523" "3786619" "3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.				
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31
S79	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
S80	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358" "6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41
S81	593	honeycomb with plug\$4 and plug\$4 with length	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S82	0	honeycomb with plug\$4 and plug\$4 with length with less than with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S83	0	honeycomb with plug\$4 and plug\$4 with length with less than	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45

S84	127	honeycomb with plug\$4 and plug\$4 with length with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:46
S85	241	honeycomb with plug\$4 and plug\$4 with length with mm	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:47
S86	41	honeycomb with plug\$4 and plug\$4 with length with "3 mm "	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:49
S87	28	honeycomb with plug\$4 and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:52
S88	28	honeycomb and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:53
S89	43	honeycomb and plug\$4 with porosity with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:06
S90	20	honeycomb and plug\$4 with pore (size or diameter) with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:07
S91	8	saw with honeycomb with filter	US-PGPUB; USPAT	ADJ	ON	2017/06/29 13:31
S92	230	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/12/01 14:36
S93	2	"20060260468"	US-PGPUB; USPAT	ADJ	ON	2018/07/03 10:34
S94	19	engine with air with inlet with filter\$4 with cone	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:26
S95	36	engine with air with inlet with filter\$4 with (cone or conical or (diameter with (increas\$4 or decreas\$4)))	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:27
S96	24	("3771638" "3870495" "3872012" "4157902" "4702754" "5125940" "5522909" "5549724" "5632793").PN. OR ("5888260").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S97	41	("0153535" "0439091" "1398685" "1530163" "1887052" "2087688" "4003836" "4018580" "4032455" "4039308" "4065276" "4261710" "4410341" "4414110" "4699715" "5106397" "5178656" "5522909" "5549722" "5549724" "5888260" "6397842" "6508052" "D401597" "D401942" "D403414" "D403416").PN. OR ("6808552").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S98	15	("D403416").URPN.	USPAT	ADJ	ON	2018/07/03 15:33
S99	0	"20030089233"	USPAT	ADJ	ON	2018/07/04 12:29
S100	3	"20030089233"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S101	26	"6833023"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S102	2	"20070168213"	US-PGPUB;	ADJ	ON	2018/07/09

			USPAT; USOCR; FPRS; EPO; JPO			13:08
S103	14	carbocations with sorbent with bromine	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:14
S104	0	a side forming a cross sectional shape of each of the first	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:47
S105	0	non of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S106	0	none of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S107	0	none of sides forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S109	13	olson.in. and (alkali and promoter and earth).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S110	0	olson.in. and (alkali and promoter and earth with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S111	10	olson.in. and (alkali and promoter with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S112	0	"2015008283"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S113	2	"20150082833"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S114	24	olson.in. and liquid.clm. and promoted	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:50
S115	75	remov\$4 with mercury and (br or bromine) with liquid with carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:54
S116	0	separating greater than "70" wt% of the mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S117	0	((separating greater) with (of the mercury)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17

S118	20	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:43
S119	40	(during with after with mercury with sorbent)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:38
S120	304	sorbent with mercury and sorbent with boiler	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:39
S121	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:41
S122	18	before with burn\$4 with coal with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:42
S123	204	("0174348" "0202092" "0208011" "0224649" "0229159" "0298727" "0346765" "0347078" "0367014" "0537926" "0537998" "0541025" "0625754" "0647622" "0685719" "0688782" "0700888" "0744908" "0846338" "0894110" "0896876" "0911960" "0945331" "0945846" "1112547" "1167471" "1167472" "1183445" "1788466" "1984164" "20020065581" "20020114749" "20020184817" "20030088370" "20030103882" "20040003716" "20040013589" "20040086439" "20040219083" "20050039598" "20060047526" "20060210463" "2016821" "2059388" "2089599" "2511288" "3194629" "3288576" "3437476" "3599610" "3662523" "3725530" "3764496" "3823676" "3838190" "3849267" "3849537" "3956458" "3961020" "3974254" "4040802" "4075282" "4094777" "4101631" "4115518" "4148613" "4174373" "4196173" "4226601" "4233274" "4272250" "4280817" "4305726" "4322218" "4377599" "4387653" "4394354" "4440100" "4472278" "4474896" "4519807" "4519995" "4555392" "4582936" "4602918" "4629721" "4693731" "4716137" "4741278" "4758418" "4764219" "4786483" "4804521" "4807542" "4824441" "4830829" "4873930" "4886519" "4892567" "4915818" "4933158" "4936047" "4964889" "5013358" "5024171")	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/01 17:42

		"5049163" "5116793" "5126300" "5137854" "5162598" "5190566" "5238488" "5350728" "5368617" "5409522" "5435980" "5447703" "5460643" "5505746" "5505766" "5571490").PN. OR ("5587003" "5618508" "5635150" "5659100" "5670122" "5733516" "5738834" "5787823" "5810910" "5897688" "5910292" "5989506" "6024931" "6083289" "6240859" "6258334" "6372187" "6375909" "6475451" "6521021" "6528030" "6533842" "6558454" "6610263" "6613110" "6719828" "6732055" "6737031" "6746531" "6790420" "6808692" "6848374" "6878358" "6942840" "6953494" "6962617" "6974564" "6975975" "7468170" "7507083" "7674442" "7758827" "7776301").PN.				
S124	1	"15573128"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:07
S125	2	"20110207597"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:08
S126	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S127	71	sorbent with before with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S128	234	"6953494"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:38
S129	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:40
S130	35	promoter with sorbent and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S131	28	promoter with sorbent with mercury and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S132	4	promoter with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:20

S133	4	promot\$4 with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:23
S134	4	promot\$4 with sorbent with mercury and pre.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:41
S135	2	promot\$4 with sorbent with mercury and pre-heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:42
S136	2	promot\$4 with sorbent with mercury and pre heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S137	57	promot\$4 with sorbent with mercury and pre	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S138	24	sorbent with preheat\$4 with coal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:39
S139	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:47
S140	23	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:28
S141	5	"14102896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:48
S142	7	"12429058"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:09
S143	4	"12202595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:23
S144	20	"12201595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:24

S145	3	"14564860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:27
S146	1	"15978760"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:28
S147	1	"15589359"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:32
S148	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:37
S149	8	"15997091"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S150	6	"14712558"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S151	2	"15951970"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:18
S152	4	"15382114"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:47
S153	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:51
S154	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:18
S155	69	"4279873"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:42
S156	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 07:59

S157	4	"15295594"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 08:08
S158	1	("20180257030").PN.	US-PGPUB; USPAT	ADJ	ON	2018/10/04 09:31
S159	86	"5569436"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:32
S160	6	"5785935"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S161	8	"6475471"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S162	53	"6103205"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:46
S163	0	pyrolysis with char with mercury with activated	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S164	17	pyrolysis with char with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S165	121	pyrolysis with char with activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S166	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S167	43	pyrolysis with char with activated carbon and mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S168	118	pyrolysis with char with tire	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S169	58	pyrolysis with char with activated carbon and mercury	US-PGPUB; USPAT; USOCR;	ADJ	ON	2018/10/04 12:04

			FPRS; EPO; JPO			
S170	8	"20040081724"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 15:07
S171	4	"14128179"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 15:10
S172	84	activat\$4 carbon with boiler with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S173	88	activat\$4 carbon with boiler with coal and (remov\$4 or filter\$4 or absorb\$4 or adsorb\$4) with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S174	0	mercury with stabiliz\$4 with sulfur dioxide	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 14:23
S175	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 15:07
S176	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:48
S177	17	"8821819"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:51
S178	15	"8652235"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:55
S179	93	"6136749"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/24 09:08
S180	4	"9757689"	US-PGPUB; USPAT	ADJ	ON	2018/10/24 12:37
S181	9	"8939388"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 09:59

S182	669	urea with inject\$4 with filter\$4 with exhaust	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:15
S183	2	urea with inject\$4 with filter\$4 with exhaust and urea with quench\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:16
S184	13	"3615165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:35
S185	136	urea with quench\$4 with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:39
S186	48	urea dust with scrub\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 11:25
S187	38	"6221155"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 12:04
S188	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 14:12
S189	773	ammonium with remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:14
S190	108	ammonium with salt with remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:15
S191	45	ammonium with salt with remov\$4 with mercury and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:15
S192	42	"5556447"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:21
S193	174	"4500327"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:21

EAST Search History

S194	72	"4500327" and ammonium	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:23
S195	3	anionic counterion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S196	3480	anionic counterion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S197	2422	anionic counterion and ammonium with salt	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S198	9	anionic counterion and ammonium with salt and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S199	52	"6960329"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:50
S200	4	"20040003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/06 11:23
S201	1	"45219176".FMID.	US-PGPUB; USPAT; FPRS	ADJ	ON	2018/12/06 13:32

1/ 7/ 2019 9:41:40 AM

C:\Users\amillerharris\Documents\EAST\Workspaces\12429058.wsp

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Application Number</td> <td>14/712,558</td> </tr> <tr> <td>Filing Date</td> <td>May 14, 2015</td> </tr> <tr> <td>First Named Inventor</td> <td>Edwin S. Olson</td> </tr> <tr> <td>Group Art Unit</td> <td>1776</td> </tr> <tr> <td>Examiner Name</td> <td>Amber Orlando</td> </tr> </table>	Application Number	14/712,558	Filing Date	May 14, 2015	First Named Inventor	Edwin S. Olson	Group Art Unit	1776	Examiner Name	Amber Orlando
Application Number	14/712,558										
Filing Date	May 14, 2015										
First Named Inventor	Edwin S. Olson										
Group Art Unit	1776										
Examiner Name	Amber Orlando										
Sheet 1 of 1	Attorney Docket No: 4820.001US7										

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20190009247A1	1/10/2019	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/382,114, Non Final Office Action mailed 12-12-18", 46 pgs	
	"Application Serial No. 15/589,359, Amendment and Response filed 01-17-19 to Non Final Office Action mailed 10-22-18", 14 pgs	
	"Application Serial No. 15/974,343, Amendment and Response filed 12-03-18 to Non Final Office Action mailed 10-29-18", 37 pgs	
	"Application Serial No. 15/974,343, Final Office Action mailed 01-14-19", 25 pgs	
	"Application Serial No. 15/978,760, Amendment and Response filed 12-03-18 to Non Final Office Action mailed 10-10-18", 25 pgs	
	"Application Serial No. 15/978,760, Final Office Action mailed 12-26-18", 21 pgs	
	"Application Serial No. 15/997,091, Final Office Action mailed 01-11-19", 20 pgs	
	"Application Serial No. 15/997,091, Response filed 12-03-18 to Non Final Office Action mailed 11-02-18", 40 pgs.	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		David L. Buck/Jamie Johnson		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt

EFS ID:	35253267
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	David L. Buck/Jamie Johnson
Filer Authorized By:	David L. Buck
Attorney Docket Number:	4820.001US7
Receipt Date:	26-FEB-2019
Filing Date:	14-MAY-2015
Time Stamp:	13:54:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	022719INTEFSW00000159190743
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		14712558_SIDS_02-26-2019.pdf	314234	yes	5
			87c4457d77f8021003b7b5a1da7b24d33ceab7a2		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Miscellaneous Incoming Letter		1	1	
	Miscellaneous Incoming Letter		2	2	
	Transmittal Letter		3	4	
	Information Disclosure Statement (IDS) Form (SB08)		5	5	
Warnings:					
Information:					
2	Non Patent Literature	0001_2_npl_4820001u10_foar_01112019_f.pdf	891808	no	20
			f20c2cd0671efa1f9f2b6af40e617a48a12cce9a		
Warnings:					
Information:					
3	Non Patent Literature	0002_2_npl_4820001u10_response_f.pdf	915746	no	40
			d4b08b2a8c4ef01e63babbb3d3b66212c718d91ab		
Warnings:					
Information:					
4	Non Patent Literature	0003_2_npl_4820001us9_foar_01142019_f.pdf	1164983	no	25
			e306bcb776338cb30b201be0cd320357339103e0		
Warnings:					
Information:					

5	Non Patent Literature	0004_2_npl_4820003us2_aarn_011719_f.pdf	177621	no	14
			f6c664a808b4d8a5f84f55ea0c955b7f69023a93		
Warnings:					
Information:					
6	Non Patent Literature	0005_2_npl_4820004us1_oarn_12122018_f.pdf	1799080	no	46
			7ba6d6612bb73b14a442f9f5c402da44c5870c4		
Warnings:					
Information:					
7	Non Patent Literature	0006_2_npl_4820007us4_foarn_12262018_f.pdf	1010863	no	21
			b669697087f650efc292078a8646f67576888c8a		
Warnings:					
Information:					
8	Non Patent Literature	0007_2_npl_4820_001us9_aarn_120318_f.pdf	950258	no	37
			ff53476c97cb9c3bf2a6948973b00227c016e60a		
Warnings:					
Information:					
9	Non Patent Literature	0008_2_npl_4820_007us4_aarn_120318_f.pdf	637752	no	25
			c84e56c897a88bdc731c777539105737a452944d		
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	30531	no	2
			48020d0b3d596dc3d3df52f276668de4f39c1c24		
Warnings:					
Information:					
Total Files Size (in bytes):			7892876		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

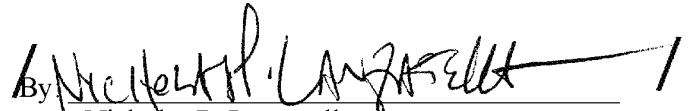
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Communication Concerning Prior and Copending Applications (1 pg.)
- ☒ Supplemental Information Disclosure Statement **Pursuant to 37 C.F.R. § 1.97(d)(1) and 37 C.F.R. § 1.97(e)(2)** (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (8).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By 
Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPENDING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

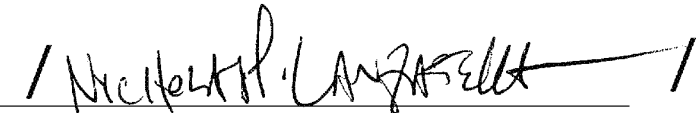
<u>Serial No./</u> <u>Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
16/130,670	September 13, 2018	4820.005US2	SORBENT COMPRISING CARBON AND NITROGEN AND METHODS OF USING THE SAME

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 02/26/2019

By



Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R §1.97(e)(2)

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(d)(1) and 37 C.F.R. § 1.97(e)(2), Applicant states that no item of information contained in the Supplemental Information Disclosure Statement was cited in any communication from a foreign patent office in a counterpart foreign application and that no item of information contained in the Supplemental Information Disclosure Statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.

Pursuant to 37 C.F.R. § 1.97(d)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R §1.97(e)(2)

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R § 1.98(a)(2).

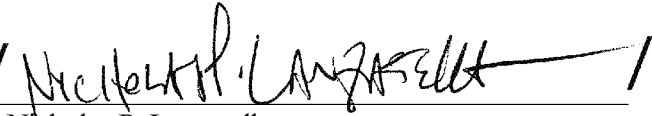
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 02/26/2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:jj

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 2		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 15/295,594, Response filed 4-23-19 to Non Final Office Action mailed 10-23-18", 45 pgs			
	"Application Serial No. 15/382,114, Response filed 3-12-19 to Non Final Office Action mailed 12-12-18", 24 pgs			
	"Application Serial No. 15/589,359, Final Office Action mailed 03-01-19", 10 pgs			
	"Application Serial No. 15/589,359, Response filed 04-30-19 to Final Office Action mailed 03-01-19", 11 pgs.			
	"Application Serial No. 15/978,760, Ex Parte Quayle Action mailed 04-19-19", 13 pgs			
	"Application Serial No. 15/978,760, Response filed 03-20-19 to Final Office Action mailed 12-26-18", 90 pgs.			
	"Application Serial No. 15/978,760, Response filed 4-23-19 to Ex Parte Quayle Action mailed 04-19-19", 15 pgs			
	"Coal Combustion Products (CCPs): Characteristics, Utilization and Beneficiation", Edited by Tom Robl, et al., Woodhead Publishing (Elsevier), (2017), 565 pgs			
	"Control of Mercury Emissions from Coal Fired Electric Utility Boilers: An Update", US EPA Air Pollution Prevention and Control Division, National Risk Management Research Laboratory, Office of Research and Development, (February 18, 2005), 59 pgs			
	"Sorbent Enhancement Additives for Mercury Control", US DOE Office of Fossil Energy, National Energy Technology Laboratory, (June 2008), 4 pgs			
	BENSON, STEVEN A., et al., "JV Task 73 - Mercury Control Technologies for Electric Utilities Burning Subbituminous Coals - Draft Final Report", University of North Dakota Energy and Environmental Research Center, (June 2005), 165 pgs			
	BENSON, STEVEN A., et al., "Pilot-and Full-Scale Demonstration of Advanced Mercury Control Technologies for Lignite-Fired Power Plants", University of North Dakota Energy and Environmental Research Center, (February 2005), 97 pgs			
	BERRY, MARK, et al., "Mercury control evaluation of calcium bromide injection into a PRB-fired furnace with an SCR", Proc. of the Air Quality VI Conference, Arlington, VA, (2007), 9 pgs			

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 2		Attorney Docket No: 4820.001US7

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	BROWN, THOMAS D., et al., "Mercury Measurement and Its Control: What We Know, Have Learned, and Need to Further Investigate", Journal of the Air and Waste Management Association, 49(6), (June 1999), 98 pgs	
	FEELEY, THOMAS J., et al., "A Review of DOE/NETL's Mercury Control Technology R and D Program for Coal-Fired Power Plants", DOE/NETL Hg R and D Program Review, (April 2003), 32 pgs	
	FRENCH, CHARLES L., et al., "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress: Volume 1", US EPA Office of Air Quality Planning and Standards, (February 1998), 502 pgs	
	GHORISHI, BEHROOZ S., et al., "In-Flight Capture of Elemental Mercury by Chlorine-Impregnated Activated Carbon", Proc. of the 94th Annual Meeting of the Air and Waste Management Association, Orlando, FL, (June 2001), 14 pgs	
	JONES, ANDREW P., et al., "DOE/NETL's Phase II Mercury Control Technology Field Testing Program: Preliminary Economic Analysis of Activated Carbon Injection", Environmental Science and Technology, 41(4), (2007), 7 pgs	
	KEATING, MARTHA H., et al., "Mercury Study Report to Congress Volume 1: Executive Summary", US EPA Office of Air Quality Planning and Standards, (December 1997), 95 pgs	
	KILGROE, JAMES D., et al., "Control of Mercury Emissions from Coal-Fired Electric Utility Boilers: Interim Report", US EPA Office of Research and Development, National Risk Management Laboratory, Air Pollution Prevention and Control Division, (December 2001), 485 pgs	
	NELSON, SID JR., et al., "How China Can Leapfrog the World in Mercury Emission Reductions", Proc. of the AWMA Intl. Specialty Conference on Leapfrogging Opportunities for Air Quality Improvement, (2010), 24 pgs	
	PAVLISH, JOHN H., et al., "Status review of mercury control options for coal-fired power plants", Fuel Processing Technology, Vol. 82, (2003), 77 pgs	
	YANG, YANG, et al., "Effect of HBr formation on mercury oxidation via CaBr(2) addition to coal during combustion", RSC Advances, 6(64), (2016), 7 pgs	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R §1.97(e)(2)

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(d)(1) and 37 C.F.R. § 1.97(e)(2), Applicant states that no item of information contained in the Supplemental Information Disclosure Statement was cited in any communication from a foreign patent office in a counterpart foreign application and that no item of information contained in the Supplemental Information Disclosure Statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.

Pursuant to 37 C.F.R. § 1.97(d)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit

copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

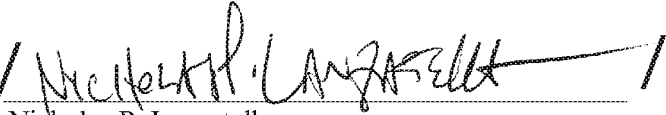
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date May 7, 2019

By



Nicholas P. Lanzatella
Reg. No. 63,803

NPL:mlr1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

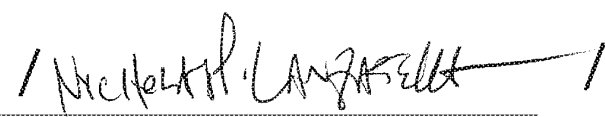
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (2 pgs.) Copies of Cited References (23).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 

Nicholas P. Lanzatella

Reg. No. 63,803

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Steven M. Reid/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt	
EFS ID:	35939352
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Steven M. Reid/Megan Reed
Filer Authorized By:	Steven M. Reid
Attorney Docket Number:	4820.001US7
Receipt Date:	07-MAY-2019
Filing Date:	14-MAY-2015
Time Stamp:	14:19:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	050819INTEFSW00000575190743
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		SIGNED_4820_001US7_SIDS.pdf	196145	yes	5
			777d763c929063da26774ddad8fac11b31f0b777		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Information Disclosure Statement (IDS) Form (SB08)		4	5	
	Transmittal Letter		2	3	
	Transmittal Letter		1	1	
Warnings:					
Information:					
2	Non Patent Literature	4820_007US3_NFOAResp.pdf	4344687	no	45
			a314950c7caad5ac0299fc63a19322cef39fa2e7		
Warnings:					
Information:					
3	Non Patent Literature	4820_007US4_AARF_03_20_19.pdf	5510807	no	90
			990cbabf8bc13046135dd3753aa2bd662d5fdb68		
Warnings:					
Information:					
4	Non Patent Literature	4820003US2_AARF_04_30_19.pdf	170092	no	11
			65a7f056710e24ae395df99e7c96bbabb469638e		
Warnings:					
Information:					
5	Non Patent Literature	4820003US2_FOAR_03012019.pdf	1051452	no	10
			c18f29db91bc9b25702573727c469670551ff2d9		

Warnings:					
Information:					
6	Non Patent Literature	4820007US4_EPQA_04192019.pdf	1212239	no	13
			1626a8372aa5e5b563fa303f34fa0c55a636b86e		
Warnings:					
Information:					
7	Non Patent Literature	15295594_AARN_4_23_19.pdf	4344689	no	45
			86be188578f52aac324ce28dd0aa93248cd487d4		
Warnings:					
Information:					
8	Non Patent Literature	15382114_AARN_3_12_19.pdf	220894	no	24
			449b30c8d235fe9d598af0da5237ba6036703112		
Warnings:					
Information:					
9	Non Patent Literature	Benson_Mercury_Control_Tech_2005.pdf	5665878	no	97
			e52881c5173c3990ff471be945360fb4b8acdfa		
Warnings:					
Information:					
10	Non Patent Literature	Benson_Subbituminous_Coals_2005.pdf	14155165	no	165
			0f3ce07e30a524a58397b6cccbcff531b20d0784		
Warnings:					
Information:					
11	Non Patent Literature	Berry_Mercury_Control_2007.pdf	230273	no	9
			bc3c0e2e8abef768927b3f1a92c4703d058ff1b4		
Warnings:					
Information:					
12	Non Patent Literature	Brown_Mercury_Measurement_2011.pdf	2629447	no	98
			8d0bd9847b0b228b22bba3a53e055291becad2d		
Warnings:					
Information:					

13	Non Patent Literature	CoalCombustionProducts_Elsevier_2017.pdf	24907456	no	565
			7f3ec4a2bc6e6855d3820cc3a346416afb53bc0d		
Warnings:					
Information:					
14	Non Patent Literature	DOE_SEAs_for_Mercury_Contr ol_2008.pdf	413912	no	4
			0b735522bddbb6d04ea58fd57c8eda2fcc848a5		
Warnings:					
Information:					
15	Non Patent Literature	EPA_Mercury_Emissions_Update_2005.pdf	1160137	no	59
			d8faad1328d7449ca9e321619c9766418effc248		
Warnings:					
Information:					
16	Non Patent Literature	Feeley_DOE_NETL_Mercury_2003.pdf	909739	no	32
			a8351a9efa95e0eba52966b66525024a54442e20		
Warnings:					
Information:					
17	Non Patent Literature	French_EPA_Utility_Report_1998.pdf	9189655	no	502
			5d4f35823de76ff70e4630f10592af134d158bb8		
Warnings:					
Information:					
18	Non Patent Literature	Ghorishi_InFlight_2001.pdf	222676	no	14
			b3c493c2ec7f8f554d84fa71f4c9d40db16148c5		
Warnings:					
Information:					
19	Non Patent Literature	Jones_DOE_NETL_Phase2_Hg_2007.pdf	243229	no	7
			bc57c74e93d0d1d5703b4afc5493566b43621d22		
Warnings:					
Information:					

20	Non Patent Literature	Keating_EPA_Mercury_Study_1997.pdf	1335584	no	95
			188bad071e057abf2319f37af9527716b296d153		
Warnings:					
Information:					
21	Non Patent Literature	Kilgroe_EPA_Mercury_Interim_Report_2002.pdf	9278781	no	485
			af72b4d4ee16bed08e45344f97e81ba311ac7d9c		
Warnings:					
Information:					
22	Non Patent Literature	Nelson_China_Emissions_2010.pdf	6086229	no	24
			cee86d1d7f6289e7fc47bcff04cdc5aad1ca194c		
Warnings:					
Information:					
23	Non Patent Literature	Pavlish_Status_Review_2003.pdf	833492	no	77
			5d7c98ba96c2dde952a876e8e473e2d7f27743e9		
Warnings:					
Information:					
24	Non Patent Literature	Yang_HBr_Hg_Oxidation_2016.pdf	1820213	no	7
			f8e818a0b3e318a572c3555b21e089d9a8a399fe		
Warnings:					
Information:					
25	Fee Worksheet (SB06)	fee-info.pdf	30120	no	2
			bc1b24f2e0bef521482df1b6b9e00a5cfd91ec47		
Warnings:					
Information:					
Total Files Size (in bytes):			96162991		

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.

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 07/16/2019

BMURPHY	SALE	#00000001	Mailroom Dt:	07/10/2019	190743	14712558
		01	FC : 1202	900.00	DA	
		02	FC : 1201	460.00	DA	

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (l), 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 \$80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x \$420 =	
☐ 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)	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	07/10/2019		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	29	Minus	** 20	= 9
	Independent (37 CFR 1.16(h))	*	5	Minus	*** 4	= 1
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						1360
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	-	Minus	**	=
	Independent (37 CFR 1.16(h))	*	-	Minus	***	=
	☐ 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".						/BRENDA MURPHY/
*** 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.

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL	<i>Application Number</i>	14/712,558
	<i>Filing Date</i>	May 14, 2015
	<i>First Named Inventor</i>	Edwin S. Olson
	<i>Confirmation Number</i>	1934
	<i>Group Art Unit</i>	1776
	<i>Examiner Name</i>	Amber Orlando
	<i>Attorney Docket Number</i>	4820.001US7
	<i>Customer No.</i>	21186

This is a Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application entitled
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

1. Submission required under 37 C.F.R. § 1.114:

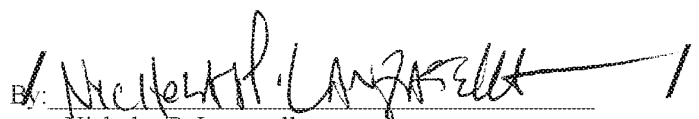
- ☒ Amendment and Response Under 37 C.F.R. § 1.116 (57 pages) is enclosed.
- ☒ Information Disclosure Statement (2 pages), Form 1449 (1 page), and copies of cited documents (6).
- ☒ Petition for Extension of Time (1 pg).

2. Fees

- ☒ Authorization to charge deposit account 19-0743 in the amount of \$1900.00 to pay the subsequent RCE filing fee required under 37 C.F.R. § 1.17(e)(2).
- ☒ Authorization to charge deposit account 19-0743 in the amount of \$1400.00 to pay the extension of time fee.

The Commissioner is hereby authorized to charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

By: 
 Nicholas P. Lanzatella
 Reg. No. 63,803

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Janal M. Kalis/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	1253	1	1400	1400
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
Total in USD (\$)				3300

Electronic Acknowledgement Receipt

EFS ID:	36547528
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Janal M. Kalis/Megan Reed
Filer Authorized By:	Janal M. Kalis
Attorney Docket Number:	4820.001US7
Receipt Date:	10-JUL-2019
Filing Date:	14-MAY-2015
Time Stamp:	16:43:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 3300
RAM confirmation Number	071119INTEFSW00003736190743
Deposit Account	190743
Authorized User	Megan Reed
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)					
37 CFR 1.20 (Post Issuance fees)					
37 CFR 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SIGNED_4820_001US7_RCE_Re sp_SIDS_Ext2.pdf	4747113 46f3e9000dc1853542c8dd5123d9710cebd c69b7	yes	62
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Extension of Time		62	62	
	Information Disclosure Statement (IDS) Form (SB08)		61	61	
	Transmittal Letter		59	60	
	Applicant Arguments/Remarks Made in an Amendment		8	58	
	Claims		3	7	
	Amendment Submitted/Entered with Filing of CPA/RCE		2	2	
	Request for Continued Examination (RCE)		1	1	
Warnings:					
Information:					
2	Foreign Reference	WO_2012030560_A1.pdf	956404 f3ba9bc976639c9f0c0eac2c4a975837f58c9 36b	no	19
Warnings:					
Information:					
3	Non Patent Literature	4820007US4_NOAR_05082019. pdf	396732 58359b85ebd004efa827f412f8f5f4e1a2a5d da6	no	7
Warnings:					
Information:					

4	Non Patent Literature	4820003US2_ADAR_05222019.pdf	385392	no	3
			7d69afab34c3f12b945a35d7c984bccca9cdbed		
Warnings:					
Information:					
5	Non Patent Literature	4820003US2_OARN_06212019.pdf	725411	no	7
			e5cd411e36653e4663d76a883ea76ba917efb147		
Warnings:					
Information:					
6	Non Patent Literature	4820004US1_FOAR_06212019.pdf	3420798	no	31
			4df6d6cc027a421318e268b85e3a594de4ac0eba		
Warnings:					
Information:					
7	Non Patent Literature	4820007US4_NALL_05302019.pdf	405171	no	3
			037a81efdb7cea4f080e1f3bdc529430be815c0c		
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	32305	no	2
			bb0e601245ced0ebd825211e8bfcd17351f20b5		
Warnings:					
Information:					
Total Files Size (in bytes):			11069326		

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.

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

PETITION FOR A THREE-MONTH EXTENSION OF TIME

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

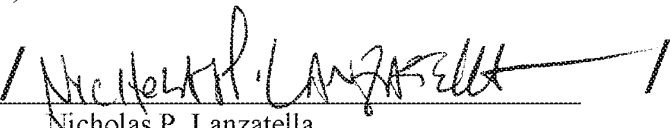
In accordance with the provision of 37 C.F.R § 1.136(a), it is respectfully requested that a three-month extension of time be granted in which to respond to the Final Office Action mailed January 11, 2019, said period of response being extended from April 11, 2019 to July 11, 2019.

Please charge Deposit Account No. 19-0743 in the amount of \$1,400.00 to cover the required extension fee. Please charge any additional fees or credit overpayment to deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date July 10, 2019

By 
Nicholas P. Lanzatella
Reg. No. 63,803

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,343,114	7/9/2019	Olson, Edwin S, et al.
	US-20120100053A1	4/26/2012	Durham, Michael D, et al.
	US-20130157845A1	6/20/2013	Nalepa, Christopher J, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	WO-2012030560A1	3/8/2012	Nalepa, Christopher J, et al.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 15/382,114, Final Office Action mailed 06-21-19", 31 pgs	
	"Application Serial No. 15/589,359, Advisory Action mailed 05-22-19", 3 pgs	
	"Application Serial No. 15/589,359, Non Final Office Action mailed 06-21-19", 7 pgs	
	"Application Serial No. 15/978,760, Notice of Allowability mailed 05-30-19", 3 pgs	
	"Application Serial No. 15/978,760, Notice of Allowance mailed 05-08-19", 7 pgs	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed after filing of the application or after the filing of the most recent RCE, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 19-0743 in order to have this Information Disclosure Statement considered.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

INFORMATION DISCLOSURE STATEMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

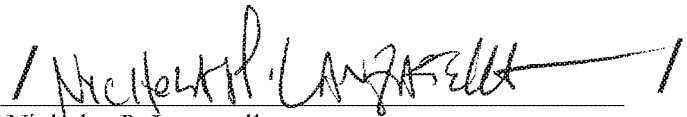
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date July 10, 2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:mlr1

REMARKS

This responds to the Final Office Action dated January 11, 2019.

Claims 66-69, 71-72, and 79-82 are presently amended. No claims are presently canceled, and claims 1-65 were canceled previously. New claims 83-94 are presently added. As a result, claims 66-94 are now pending in this application.

Independent claim 66 is presently amended to recite "...combusting a mixture comprising coal, pyrolysis char, and an additive comprising HBr, a bromide compound, or a combination thereof ~~promoter~~, to form the mercury-containing gas, ~~wherein the promoter comprises HBr, Br⁻, or a combination thereof...~~" Independent claims 79, 81, and 82 are correspondingly amended. Support can be found in the present published U.S. application at paragraphs [0054] and [0071].

Dependent claim 71 is presently amended to recite "~~...monitoring~~ measuring the mercury content of the ~~cleaned gas~~ mercury-containing gas; and ~~controlling~~ modifying, in response to the monitored mercury content of the cleaned gas, ~~a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, an injection rate of injecting the sorbent into the mercury-containing gas, an amount of the additive in the mixture, or a combination thereof, or a combination thereof~~ so that the mercury content of the cleaned gas is maintained at or below the desired level." Support can be found in the present published U.S. application at paragraphs [0027] and [0091].

No new matter is added via the claim amendments herein.

The following table shows support for the new claims in the present published U.S. application.

New claim	Support
83	[0091]
84	[0009], [0054], [0081], and [0086]
85	[0070] and Example 10 at [0119]
86	Example 10 at [0119]
87	[0078]
88	[0120]
89	[0091]
90	[0106]
91	[0120]
92	[0119], [0108]
93	[0108]
94	[0110]

No new matter is added via new claims 83-94. Dependent claims 83-94 depend directly or indirectly from independent claim 66. As such, these dependent claims incorporate all the features of claim 66. Accordingly, claims 83-94 are patentable for at least the reasons given herein for patentability of independent claim 66.

Summary of Arguments.

The inventors of the present application have discovered that by combusting coal in the presence of an additive including HBr or a bromide compound (e.g., a compound including Br⁻), and by placing an activated carbon sorbent in the mercury-containing gas, as presently claimed, the activated carbon can be promoted by the promoter in-flight in the mercury-containing gas. For example, when NaBr is added to coal, gaseous NaBr is formed in the flue gas, and HBr is formed in the flue gas.¹ NaBr is a salt that includes Na⁺ and Br⁻.

¹ As described in the paper "Effect of HBr formation on mercury oxidation via CaBr₂ addition to coal during combustion", Y. Yang et al., RSC Adv., 2016, 6, 59009-59015 ("Yang"), in a bench-scale simulated coal-fired power plant, CaBr₂ was added in various concentrations to three different types of coal that were combusted and the concentration of HBr and Br₂ in the released combustion gases were analyzed by quantitative gas analysis mass spectrometry. See, Yang at Sections 2.1-2.2. Section 3.4 states at page 59012 bridging to page 59013 that "[t]he results confirmed the generation of HBr in coal-fired flue gas due to the CaBr₂ additive in coal, but Br₂ was not detected." Near the end of Section 3.4 at page 59013 Yang states that "[t]he HBr concentration in flue gas increased with increasing amounts of CaBr₂ additive...." At the top of the right column on page 59013, Yang proposes the following formula for the generation of HBr from CaBr₂: $\text{CaBr}_2 + \text{H}_2\text{O} \rightarrow \text{CaO} + \text{HBr}$, stating at page 59013 from the left column bridging to the right column that the water is generated by hydrogen-containing organisms in coal during combustion via $\text{C}_n\text{H}_m\text{OH} + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{CO}_2$.

As described in the paper "Mercury control evaluation of calcium bromide injection into a PRB-fired furnace with an SCR", M. Berry, Proceedings of the Air Quality VI Conference, Arlington, VA, 2007 ("Berry"), a CaBr₂ was

The Examiner has not established a *prima facie* case of obviousness, because the cited references do not provide a motivation to attempt in-flight promotion with HBr or Br⁻ over pre-treatment of sorbents. As an initial matter, while Felsvang does mention supplying chloride to coal and providing activated carbon in flue gas, Felsvang does not teach that this process promotes the activated carbon. The Examiner fails to identify any teaching in the art that exposure of activated carbon to halogen- or halide-containing flue gas (as opposed to, e.g., concentrated halogen or halide gas) would generate a promoted sorbent, as opposed to, for example, the activated carbon and the halogen or halide in the flue gas providing independent, albeit complementary, mechanisms for mercury removal. For example, a person with a cold may expect aspirin and a decongestant to work well together at reducing symptoms, but that does not mean that taking the two compounds together will cause an additional beneficial chemical reaction.

injected at various concentrations into the furnace of a full-scale coal-fired power plant and the concentration of HBr in the released combustion gases were analyzed at the ESP inlet and at the ESP outlet. Berry found that HBr content increased with increasing calcium bromide injection. See, Berry at page 5, top two paragraphs and Figure 3.

As described in the book "Coal Combustion Products (CCPs) Characteristics, Utilization, and Beneficiation", T. Robl et al., Woodhead Publishing, 2017, ("Robl"), at page 91, last full paragraph and last partial paragraph:

As described previously, eastern coals with a higher chlorine content produce mostly oxidized mercury in their flue gases, while western coals, such as PRB coals, that have a low chlorine content tend to produce mostly elemental mercury. ...

Halogen salts such as calcium chloride (CaCl₂), calcium bromide (CaBr₂), or potassium iodide (KI) can be added to the coal as a means of supplementing the coal chlorine content. Salts added with the coal or injected into the furnace decompose at furnace temperatures to form vapor-phase acids (HCl, hydrogen bromide (HBr), or hydrogen iodide (HI)) in the flue gas.

Typical temperatures in a coal-combustion furnace range from 2,400-4,200 °F, with internal flame temperatures reaching 4,000-4,200 °F or higher. Table 1 lists select halide salt boiling points. Coal-combustion furnace temperatures are higher than the boiling points of halide salts such as NaBr and CaBr₂. Thus, the conditions and environment inside the furnace/boiler are adequate for boiling of halide salts (whether in a solid state, in a liquid solution, or as part of the coal) to form gaseous molecules.

Table 1. Common Halide Salt Boiling Points. Source: Lide, D.R., 1995, CRC handbook of chemistry and physics: a ready-reference book of chemical and physical data, CRC press.

Compound	Boiling point, °F
NaBr	2,534
NaCl	2,669
NaI	2,379
CaCl ₂	3,516
CaBr ₂	3,299
CaI	2,012
NH ₄ Br	745
NH ₄ Cl	640
NH ₄ I	761

As the Examiner acknowledges, the Nelson reference does not teach in-flight promotion in the flue gas as a way to create a promoted sorbent, nor does Nelson teach adding any chemical to the flue gas would improve mercury removal. Quite the contrary, Nelson describes pre-treating sorbent (i.e., outside of flue gas) as an “essential element” of his invention.² He offers specific reasons as to why pre-treatment was viewed as essential. For example, he notes that bromine species can be “quite corrosive,”³ the carbon should be “uniformly exposed to and reacted with the bromine,”⁴ the carbon should be purged of H₂O which interferes with bromination,⁵ and he describes a mixing time for HBr and activated carbon of 90 minutes or more⁶. As explained more fully below, a person of ordinary skill in the art would recognize that the combustor and flue gas ductwork are composed of corrodible metal, the concentration of halogen in the flue gas would be low, the flue gas would contain significant H₂O (e.g., 7% as per Nelson)⁷, and that in-flight mixing would allow for only several seconds of contact time between the activated carbon and the promoter rather than 90 minutes. Thus, Nelson would motivate a person of ordinary skill in the art to promote sorbents in a controlled setting outside of a flue gas, not to attempt in-flight promotion in a flue gas. At the very least, Examiner has not shown that a person of ordinary skill in the art would be motivated to modify Felsvang in view of Nelson.

The Rejection of Claims Under §103

I. The Office Action rejected claims 66-77 and 79-82 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 (“Felsvang”) in view of U.S. patent application no. 2004/0003716 (“Nelson”) and U.S. patent no. 4,699,896 (“Sing”).

This rejection is respectfully traversed.

² Nelson at paragraph [0040].

³ Nelson at paragraph [0044].

⁴ Nelson at paragraph [0046].

⁵ Nelson at paragraphs [0048] and [0051].

⁶ Nelson at page 8, paragraph [0087] and the table at the top of the second column. For HBr-treated activated carbon, the adsorption rate was 1 gram of HBr absorbed per 1 kg of activated carbon per minute, or 0.1 wt% HBr absorbed per minute, meaning that to reach the 9 wt% HBr reported in the table required about 90 minutes. Note that Figure 14 reports results for 10 wt% HBr, and Figure 15 reports results for 9 wt% HBr. For Br₂-treated activated carbon, the adsorption rate was 10 grams of Br₂ absorbed per 1 kg of activated carbon per minute, or 1 wt% Br₂ absorbed per minute, meaning that to reach the 15 wt% Br₂ reported in the table required about 15 minutes. Note that Figures 14 and 15 report results for 1.5 wt%, 5 wt%, and 15 wt% Br₂, according to the table requiring about 1.5 to 15 minutes to form.

⁷ Nelson at paragraph [0079].

Independent claim 66 is presently amended to recite "...combusting a mixture comprising coal, pyrolysis char, and an additive comprising HBr, a bromide compound, or a combination thereof ~~promoter~~, to form the mercury-containing gas, ~~wherein the promoter comprises HBr, Br⁻, or a combination thereof...~~" Independent claims 79, 81, and 82 are correspondingly amended.

As explained herein at **I(A)**, there would be no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process. As explained herein at **I(B)**, Sing fails to remedy the defects of Nelson and Felsvang. Part **I(C)** presents responses to the Examiner's responses to arguments made in the last response.

I(A). There would be no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process.

The Office Action admits that Felsvang fails to describe or suggest a halogen or halide promoter that is Br₂, HBr, or Br⁻. Nelson fails to describe or suggest in-flight promotion of activated carbon with a halide or hydrogen halide in the flue gas. The Office Action alleges that one of ordinary skill in the art would replace Felsvang's HCl or Cl⁻ with Nelson's HBr to accomplish the presently claimed method, stating that such a modification of Felsvang would be made "...to promote activated carbon (Nelson paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury." (Office Action, page 22, first partial paragraph). Applicant respectfully disagrees. As explained below, a person of ordinary skill in the art would not be motivated to use Nelson's HBr in Felsvang's process, because Nelson fails to describe or suggest that HBr-treatment of activated carbon provides similar, let alone improved, mercury-removal ability as compared to HCl or Cl⁻-treatment of activated carbon.

Felsvang is directed to adding chlorine (Cl₂) or chloride (Cl⁻) materials to the coal or combustion products. Felsvang makes clear that addition of chlorine or chloride material increases the amount of chloride supplied to the flue gas, or to the drying-absorption zone, see, Abstract and col. 3, lines 40-44. Felsvang states at col. 3, line 67 bridging to col. 4, line 4: "[i]t has been experienced that the increase of the Hg-removing effect of chloride addition to the drying-absorption zone in a process treating flue gases of low chloride content is especially remarkable when activated carbon is present..." Felsvang states at col. 4, lines 51-55: "...most chloride or

chlorine containing compounds will release gaseous chlorides when introduced into the combustion zone of a coal fired boiler....” Felsvang states at col. 6, lines 3-11:

If the chloride content is found to be below a certain value as defined above and in the attached claims arrangements are taken according to the invention for increasing the gas chloride content. This may be done in connection with an introduction of activated carbon which in itself also has a Hg removing effect and together with chloride addition exhibits a synergistic effect enabling an extremely efficient Hg removal.

At column 3, lines 53-55, Felsvang states that “[t]he term ‘chloride’ is intended to mean chloride ions as such or gaseous hydrogen chloride or compounds which by heating in the presence of coal forms Cl^- or HCl .” Thus, Felsvang gives a definition of “chloride” that includes both HCl and Cl^- .

As explained herein at **I(A)(1)**, a person of ordinary skill in the art would not combine Nelson with Felsvang as alleged because Felsvang fails to describe or suggest in-flight promotion can occur. As explained herein at **I(A)(2)**, a person of ordinary skill in the art would not be motivated to use Felsvang’s process with activated carbon. As explained herein at **I(A)(3)**, Nelson provides no motivation to replace Felsvang’s HCl or Cl^- treatment with Nelson’s HBr treatment.

I(A)(1). A person of ordinary skill in the art would not combine Nelson with Felsvang as alleged because they would not know or expect in-flight promotion of the activated carbon sorbent would occur.

As explained herein at **I(A)(1)(a)**, a person of ordinary skill in the art would not combine Nelson with Felsvang as alleged because Felsvang fails to describe or suggest in-flight promotion can occur. As explained herein at **I(A)(1)(b)**, promoter concentration in flue gas is low compared to during treatment outside of flue gas. As explained herein at **I(A)(1)(c)**, contact time between promoters in the flue gas and activated carbon is very short compared to treatment outside the flue gas. As explained herein at **I(A)(1)(d)**, a person of ordinary skill in the art would believe that hydrogen halides in the flue gas would be consumed via corrosion or scavenging.

I(A)(1)(a). A person of ordinary skill in the art would not combine Nelson with Felsvang as alleged because Felsvang fails to describe or suggest in-flight promotion can occur.

Felsvang fails to describe or suggest that any reaction occurs between activated carbon and HCl in the flue gas. Felsvang's primary focus is the enhancement of HCl or Cl⁻ concentration in the flue gas, with addition of activated carbon being optional and not required to experience the effect of the invention. At col. 6, lines 29-33, Felsvang states "...the chloride introduction may alternatively be performed separately from the introduction of activated carbon or it may be performed without using activated carbon." At col. 6, lines 8-11, Felsvang explains that, in addition to increasing the chloride content, (emphasis added) "[t]his may be done in connection with an introduction of activated carbon which in itself also has a Hg removing effect and together with chloride addition exhibits a synergistic effect enabling an extremely efficient Hg removal." Felsvang therefore describes that activated carbon removes mercury, and that increasing HCl or Cl⁻ content removes mercury, and when the two are used together they operate side-by-side, failing to describe or suggest any reaction that occurs between the HCl or Cl⁻ and the activated carbon. Only a portion of Felsvang's Example 4 demonstrates the use of activated carbon with HCl or Cl⁻, finding only a small increase in mercury-removal activity (discussed herein at **I(A)(2)**), while the majority of Felsvang's Examples (1-3) are devoid of any mention of activated carbon.

In contrast, Nelson describes a chemical reaction that occurs between the halogens and the activated carbon, and disparages simple impregnation or physical adsorption of halogens onto the activated carbon, explaining at paragraphs [0017] and [0044] that physical adsorption leads to desorption from the activated carbon. Nelson explains at paragraphs [0044] and [0053] that elevated temperatures should be used during the treatment of the activated carbon with the bromine gas to minimize physical absorption and maximize chemical reaction between the bromine and the activated carbon which avoids desorption of the bromine during transport, storage, and upon injection into a hot gas stream.

A person of ordinary skill in the art would have to understand that a reaction can occur between Felsvang's HCl or Cl⁻ and the activated carbon in Felsvang's flue gas in order to understand that Nelson's bromine-treated sorbents have any similarity to the sorbents of Felsvang. With Felsvang's failure to describe or suggest any chemical reaction between the activated carbon and the HCl or Cl⁻ in the flue gas, a person of ordinary skill in the art would have no idea that

Nelson's hydrogen bromide could be used in place of Felsvang's HCl or Cl⁻. Therefore, a person of ordinary skill in the art would not replace Felsvang's HCl or Cl⁻ with HBr or Br⁻. Independent claims 66, 79, 81, and 82 are patentable for at least this reason.

Merely for the sake of argument, if a person of ordinary skill in the art were to simply inject Nelson's HBr-treated activated carbon into Felsvang's flue gas, the resulting process would not be encompassed by the present claims. The independent claims recite combustion of a mixture that includes the additive that includes the HBr or bromide compound, or that the combustion chamber includes the additive that includes the HBr or bromide compound, neither of which are described or suggested by Nelson or Felsvang.

I(A)(1)(b). Promoter concentration in flue gas is low compared to during treatment outside of flue gas.

At paragraph [0051] Nelson gives a preference for the use of pure Br₂ or HBr to treat the activated carbon. Nelson's Examples do not mention the use of a carrier gas to dilute the halogen gases used to prepare the treated sorbents used therein.

Forming HBr or Br⁻ in the flue gas from bromide salts such as NaBr on coal gives a very low concentration of HBr/Br⁻ in the flue gas compared to pure HBr. A person of ordinary skill in the art would believe the concentration of HBr/Br⁻ in the flue gas would be too low to result in effective treatment of activated carbon injected into the flue gas, especially considering the short contact time between the HBr/Br⁻ and the activated carbon as discussed herein at **I(A)(1)(c)**.

I(A)(1)(c). Contact time between promoters in the flue gas and activated carbon is very short compared to treatment outside the flue gas.

Nelson states repeatedly that the bromine-containing gas is to be contacted with the activated sorbent "for a sufficient time" to increase the ability of the activated carbon to adsorb mercury. See, e.g., Abstract and paragraphs [0023] and [0028]. Nelson at page 8, paragraph [0087] and the table at the top of the second column describes contact times required to form HBr- and Br₂-treated activated carbons. For HBr-treated activated carbon, the adsorption rate was 1 gram of HBr absorbed per 1 kg of activated carbon per minute, or 0.1 wt% HBr absorbed per minute, meaning that to reach the 9 wt% HBr reported in the table required about 90 minutes. Note that Figure 14

reports results for 10 wt% HBr, and Figure 15 reports results for 9 wt% HBr. For Br₂-treated activated carbon, the adsorption rate was 10 grams of Br₂ absorbed per 1 kg of activated carbon per minute, or 1 wt% Br₂ absorbed per minute, meaning that to reach the 15 wt% Br₂ reported in the table required about 15 minutes. Note that Figures 14 and 15 report results for 1.5 wt%, 5 wt%, and 15 wt% Br₂, according to the table requiring about 1.5 to 15 minutes to form. In contrast, contact times between a promoter in the flue gas and activated carbon injected therein are generally less than 10 seconds.

A person of ordinary skill in the art would believe the contact time between HBr/Br⁻ in the flue gas would be too short to increase the ability of the activated carbon injected into the flue gas to adsorb mercury, especially considering the low concentration of HBr/Br⁻ in the flue gas as discussed herein at I(A)(1)(b).

I(A)(1)(d). Consumption of hydrogen halides in the flue gas via corrosion or scavenging.

Nelson states at paragraph [0044] that a corrosion-resistant material should line the equipment used to mix the bromine gas and the activated carbon "...because the bromine species can be quite corrosive." Nelson states at paragraph [0051] that "[i]t is not a preferred embodiment of this invention to include water with the bromine gas vapor if this causes corrosion problems in the processing equipment that outweigh any advantages."

A person of ordinary skill in the art would believe that HBr in the flue gas would be consumed via corrosion of the combustion chamber and other metallic areas of the coal-combustion plant in contact with the flue gas, or via scavenging by other species present in the flue gas. As a result, a person of ordinary skill in the art would believe that an inadequate concentration of HBr would be present for reaction with activated carbon injected into the flue gas, especially considering the low concentration of HBr/Br⁻ in the flue gas as discussed herein at I(A)(1)(b), and the short contact time between the HBr/Br⁻ and the activated carbon as discussed herein at I(A)(1)(c).

I(A)(2). A person of ordinary skill in the art would not be motivated to use Felsing's process with activated carbon.

Felsing gives no data showing that the addition of HCl or Cl⁻ additives to coal can produce enhanced HCl or Cl⁻ concentrations in the activated carbon. Felsing includes only a single

Example showing the use of activated carbon for mercury removal, Example 4, the relevant portions of which are reproduced below (col. 9, lines 21-46):

HCl concentration in the flue gas was 142 mg/Nm³. Mercury was measured in and out of the system. The following results were achieved:

Inlet μgHg/Nm ³ at 5% O ₂	Outlet μgHg/Nm ³ at 5% O ₂	% Removal
5.4	0.14	97
5.2	0.18	97
5.0	0.20	96
4.7	0.18	96

Average removal with this system is 96%.

The above process was modified by adding activated carbon through conduit 14 to the stream of flue gas in duct 4 upstream of the drying chamber. Mercury was measured in and out of the system.

The following results were achieved:

Amount of carbon mg/Nm ³	Inlet μgHg/Nm ³ at 5% O ₂	Outlet μgHg/Nm ³ at 5% O ₂	% Removal
8	4.0	0.10	98
8	4.4	<0.01	>99.8
36	6.2	0.01	99.8
36	5.6	<0.01	>99.7

Felsvang finds in Example 4 that HCl alone provided 96-97% mercury removal, while the addition of activated carbon provided 98-99.8% mercury removal, an improvement of only 1-3.8%. In contrast, Felsvang's Comparative Examples 1-3, performed with no added HCl or Cl⁻ in the flue gas and no activated carbon, had a mercury removal of 1-37%. The activated carbon in Example 4 provided scarcely any improvement, with the vast majority of mercury removal improvement occurring in the presence of HCl alone without activated carbon. An improvement of 1-3.8% does not demonstrate a synergistic effect between HCl and activated carbon, especially in view of the 60-

96% improvement in mercury removal achieved by HCl alone when Example 4 is compared to Comparative Examples 1-3. One of ordinary skill in the art would know that such a small improvement could have been caused by variability in combustion gas conditions and the accuracy of the measurements—evidence for any improvement from the use of activated carbon with the HCl in Felsvang is very weak and may not have occurred at all.

In addition, Felsvang fails to describe or suggest that in-flight promotion of activated carbon with HCl or Cl⁻ in the flue gas provides better mercury removal than treatment of activated carbon outside the flue gas with HCl. If one of ordinary skill in the art were hypothetically considering whether to use Felsvang's HCl or Cl⁻ treatment of activated carbon in the flue gas or Nelson's treatment of activated carbon outside the flue gas to remove mercury, that person would pick the process that results in the best mercury removal. Before considering modifying either one of the references, the person of ordinary skill would notice the extremely poor improvement (if any improvement actually occurred) caused by addition of activated carbon in Felsvang's sole Example showing the use of activated carbon (Example 4) which would lead one of ordinary skill in the art away from using Felsvang's process.

Therefore, a person of ordinary skill in the art hypothetically having Felsvang and Nelson in-hand would not select the Felsvang process to follow or modify and therefore would not be motivated to combine Felsvang and Nelson as alleged. Independent claims 66, 79, 81, and 82 are patentable over Felsvang and Nelson for this additional reason.

I(A)(3). Nelson provides no motivation to replace Felsvang's HCl or Cl⁻ treatment with Nelson's HBr treatment.

For a person of ordinary skill in the art to be motivated to replace Felsvang's HCl- or Cl⁻-treatment with treatment by another material to provide an effective activated carbon sorbent for mercury removal, that person would need to think that the material they are using to replace the HCl or Cl⁻ would result in the same or better mercury-removal efficiency. However, as explained below, Nelson fails to describe or suggest that treatment of activated carbon with HBr provides the same, let alone better, mercury removal efficiency as activated carbon treated with HCl or Cl⁻.

At paragraph [0017], Nelson states:

[0017] The particular advantages of using bromine, rather than iodine or iodides, or chlorine or chlorides, with activated carbons for mercury control have not been previously appreciated. Gaseous bromine and hydrogen bromide have been combined with carbon substrates before, but not to sequester mercury from hot combustion-gas streams. For example, Greinke U.S. Pat. No. 5,372,619 found that bromine-treated carbon can make a superior natural-gas storage medium. In another example, SKC Inc. sells a small tube with hydrobromic acid-treated charcoal to sample air for ethylene oxide. However, with both of these uses it is important that the adsorption targets, natural gas and ethylene oxide, be easily desorbable from the carbon, the exact opposite of what is required in a mercury vapor sequestration application. In a similar vein, in U.S. Pat. No. 6,475,461 Ohsaki describes a process for treating carbon substrates with gaseous bromine or chlorine, but then explicitly desorbs them to achieve his desired product. Seki U.S. Pat. No. 3,961,020; Yoshida and Seki et al. U.S. Pat. No. 4,174,373; and Knoblauch et al. U.S. Pat. No. 5,179,058 impregnate activated carbon with bromine to produce a catalyst for reacting nitrogen oxide with ammonia to form nitrogen and water. In this application too, the bromine of the carbon does not act as a sequestration agent, permanently tying up its target. Rather, it serves as a catalyst, taking part in a repeated series of desired chemical reactions, but not becoming permanently consumed by any of them. Perhaps it is understandable that the tenacity of carbon-bromine-mercury complexes could be overlooked.

The first sentence of paragraph [0017] refers to the "...particular advantages of using bromine..." for treatment of activated carbons for mercury control, which must mean either elemental bromine (Br_2) or the element bromine generally, and is not a specific reference to bromides (Br^-). The "...particular advantages of using bromine..." is compared to iodine (I_2), iodides (I^-), chlorine (Cl_2), and chlorides (Cl^-), but no specific comparison is made between bromides (Br^-) and chlorides (Cl^-). However, it does not make sense for Nelson to refer to the element bromine generally while specifically distinguishing between chlorine (Cl_2) and chlorides (Cl^-), and iodine (I_2) and iodides (I^-) in the same sentence. If Nelson wanted to compare both

elemental bromine (Br_2) and hydrogen bromide (HBr) to the other halides specifically disclosed in the first sentence, Nelson would have specifically distinguished between bromine (Br_2) and bromides (Br^-); therefore, "...bromine..." in the first sentence of paragraph [0017] would be interpreted as elemental bromine (Br_2), and not as the element bromine generally.

No "...particular advantages of using bromine..." are explicitly described in paragraph [0017], with the remainder of the paragraph focusing on the failure of the prior art to use bromine with activated carbon for mercury control, describing various disadvantages of other processes, such as the desorbability of Br_2 , HBr , or Cl_2 from the activated carbon, or the failure of the Br_2 or HBr to act as a mercury sequestration agent. The paragraph concludes with a statement that it is understandable that "...the tenacity of carbon-bromine-mercury complexes..." could be overlooked, which must refer to complexes including either elemental bromine (Br_2) or the element bromine generally, with no specific reference to bromide (Br^-) or complexes formed therefrom. The concluding statement of paragraph [0017] is directed toward the discussion in the bulk of paragraph [0017]—the prior art fails to use bromine with activated carbon for mercury control and therefore fails to generate carbon-bromine-mercury complexes—rather than as a statement of any relative advantage of bromine over other halogens or halides. The "...tenacity of carbon-bromine-mercury complexes..." is not specifically compared to the strength of any other complexes, such as carbon-chlorine-mercury complexes, carbon-chloride-mercury complexes, carbon-iodine-mercury complexes, or carbon-iodide-mercury complexes; therefore, at best, the "...tenacity..." of the complexes described in the last sentence of paragraph [0017] can be regarded as a general statement, rather than as a comparative one. Paragraph [0017] fails to attribute any advantage of Nelson's invention specifically to HBr or Br^- , and, moreover, fails to describe or suggest that HBr or Br^- treatment of activated carbon could provide equal, let alone better, mercury removal than HCl or Cl^- treatment of the activated carbon.

At paragraphs [0019]-[0022], Nelson states:

[0019] Accordingly, it is an object of the present invention to provide a sorbent material that can be injected into a hot mercury-containing combustion gas, so that a significant portion of the mercury is adsorbed onto the sorbent and removed from the flue gas with the combustion fly ash.

[0020] Further, it is an object of the present invention to provide a flexible, retrofitable mercury-control method that can be applied to a number of combustion gas streams and a wide range of exhaust system equipment configurations.

[0021] In addition, it is an object of the present invention to provide a mercury sorbent material that is simple and inexpensive to manufacture and use.

[0022] It is also an object of the present invention to provide a mercury sorbent material that causes the adsorbed gas-phase mercury to become essentially permanently-sequestered from future interactions with the environment.

Paragraphs [0019]-[0022] describe several general advantages of Nelson's activated carbon treatment, including the ability to remove mercury from a hot mercury-containing combustion gas, a flexible and retrofitable method that can be applied to a wide range of equipment configurations, simplicity and ease of use, and permanent sequestration of the mercury from environmental interactions. None of the advantages include equal or greater mercury-removal ability of HBr- or Br⁻-treated activated carbon as compared to HCl- or Cl⁻-treated activated carbon.

At paragraphs [0023]-[0024], similarly to what is stated in the Abstract and paragraphs [0028]-[0029], Nelson states:

The mercury sorbent is prepared by treating a carbonaceous substrate with an effective amount of a bromine-containing gas for a sufficient time to increase the ability of the carbonaceous substrate to adsorb mercury and mercury-containing compounds.

[0024] In some aspects of the invention, the bromine-containing gas comprises at least one of: elemental bromine and hydrogen bromide. In some aspects of the invention, the carbonaceous substrate comprises activated carbon.

Nelson therefore states that elemental bromine (Br_2) or hydrogen bromide (HBr) can be used to treat an activated carbon outside of a flue gas to increase the ability of the activated carbon to absorb mercury.

At paragraph [0041], Nelson states:

[0041] I have discovered that the simple act of exposing a carbonaceous material, preferably powdered activated carbon (PAC), to gaseous bromine, $\text{Br}_2(\text{g})$, or to gaseous hydrogen bromide, $\text{HBr}(\text{g})$, significantly increases the carbonaceous material's ability to remove mercury species when injected into high-temperature coal-fired flue-gas compositions. Surprisingly, gaseous bromine produces a much more effective and appropriate carbon sorbent for mercury in hot combustion gases than do iodine or iodide species, or chlorine or chloride species, in contrast to what has been taught in the prior art.

Paragraph [0041] begins by stating that gaseous bromine (defined as Br_2) or hydrogen bromide (HBr) increases the mercury absorption capacity of activated carbon. Then, paragraph [0041] goes on to explicitly state that gaseous bromine, defined as Br_2 in the prior sentence, produces a more effective mercury-absorbing carbon sorbent than iodine (I_2), iodide (I^-), chlorine (Cl_2), or chloride (Cl^-). With the precise definitions given for gaseous bromine and hydrogen bromide, and then reference only to gaseous bromine in the next sentence, Nelson makes clear that the comparison of efficacy is only with respect to elemental bromine (Br_2) and not hydrogen bromide. Like paragraph [0017], paragraph [0041] also fails to describe or suggest that hydrogen bromide treatment of activated carbons is more effective for mercury removal than HCl or Cl^- treatment of activated carbons.

At paragraph [0042], Nelson states:

[0042] The combination of carbon and gaseous bromine produces an inexpensive sorbent material that can be simply injected into the ductwork of a power plant ahead of an existing electrostatic precipitator, without the need for large volumes of sorbent, retrofitted flue-gas cooling, or extended sorption time on an additional fabric filter.

Paragraph [0042]'s reference to "gaseous bromine" refers only to elemental bromine (Br_2) due to the explicit definition given in the preceding paragraph [0041]. Paragraph [0042] expands on the advantage mentioned at paragraphs [0020]-[0021], stating that an advantage of the invention includes simple injection of the treated activated carbon sorbent into the ductwork ahead of an ESP, without the need for large volumes of sorbent, retrofitted flue-gas cooling, or extended sorption time on a filter.

At paragraph [0043], Nelson states:

[0043] While not intending to be limited by hypothesized chemistry, it appears that in exposing PAC to concentrated bromine gas, a relatively large quantity of the bromine reacts with the carbon, forming surface compounds on the large surface-area of the carbon. When the PAC is then injected into the flue gas, the elemental mercury and oxidized mercury species there appear to react with at least one form of the bromine-carbon surface compounds that were created and are held fast. When the carbon particles are removed from the flue gas along with the fly ash by the electrostatic precipitator (ESP) or fabric filter, the mercury is removed with them. The mercury sorbents are then disposed of with the fly ash. Because the mercury has been chemically adsorbed, rather than just physically adsorbed, the captured mercury appears to be very stable and does not revolatilize or leach.

Paragraph [0043] expands on the general advantage described in paragraph [0022] of permanent sequestration of the mercury from environmental interactions. The advantage is not described or suggested to include equal or greater mercury-removal ability of HBr - or Br^- -treated activated carbon as compared to HCl - or Cl^- -treated activated carbon.

At paragraph [0044], Nelson states:

[0044] Production of the new mercury sorbent materials is simple and inexpensive. The carbon material and the bromine gas need simply be contacted with each other for the advantageous mercury-reactive surface compounds to quickly form. Elemental bromine is a liquid at ambient temperature, but turns to a gas at only a modestly elevated temperature. Hydrogen bromide is a gas at even ambient temperature. Using a gas-phase carbon reactant considerably simplifies the production of the sorbent and leads to the low costs which are a requirement for a sorbent to be used as a once-through duct injectant. Any common mixing method and equipment can be use to contact the gaseous bromine species with the carbon-based substrates, although it is preferably lined with corrosion-resistant material, because the bromine species can be quite corrosive. It is also preferable that the mixing of bromine gas and carbon be done at an elevated temperature. This keeps the bromine gas in the gaseous form, but also minimizes the amount of any bromine physically-adsorbed into the pores of the carbon. Such physically adsorbed bromine is not chemically bound to the carbon lattice and can be emitted in handling, in storage, and especially, when the sorbent is injected into a hot flue gas.

Paragraph [0044] expands on the general advantage described in paragraph [0021] of simple and inexpensive generation and use of the treated activated carbon sorbent. Paragraph [0044] also describes that elevated temperature during treatment can provide an advantage of reduced physical-adsorption of the elemental bromine or the hydrogen bromide, which helps to avoid emission during handling, storage, and during injection into a hot flue gas. The advantages are not described or suggested to include equal or greater mercury-removal ability of HBr- or Br⁻-treated activated carbon as compared to HCl- or Cl⁻-treated activated carbon.

At paragraph [0047], Nelson states:

the process. An example would be a powdered activated carbon (PAC). Such a material would already have some gas-phase mercury adsorption capability which the treatment process of this invention will greatly amplify.

Nelson therefore states that the treatment process therein amplifies the mercury absorption capabilities of activated carbon. The advantage is not described or suggested to include equal or

greater mercury-removal ability of HBr- or Br⁻-treated activated carbon as compared to HCl- or Cl⁻-treated activated carbon.

At paragraph [0049], Nelson states:

[0049] A critical element in the process is that a bromine-containing gas 3 is used to treat the carbonaceous substrate. Preferably this gas comprises elemental bromine, Br₂(g), although other bromine-containing gases, such as hydrogen bromide, HBr, will also have the advantageous effect of the invention.

Nelson therefore states that elemental bromine (Br₂) or hydrogen bromide (HBr) gas can be used to treat an activated carbon outside of a flue gas. Nelson also states that use HBr to treat the activated carbon "...will also have the advantageous effect of the invention." Nelson uses the singular "...effect..." and does not state that HBr can have all of the advantageous effects of Br₂ described therein; however, which particular advantageous effect does Nelson refer to? Further, Nelson refers generally to the advantageous effect of "...the advantageous effect of the invention..." but does not state that HBr can have all the advantageous effects of elemental bromine (Br₂); rather, Nelson states that HBr, like Br₂, can have "...the advantageous effect of the invention." By "...advantageous effect of the invention..." Nelson refers to general advantages of "...the invention..." and not specifically to advantages of Br₂; therefore, advantages specifically attributed to Br₂ in Nelson would not be imputed to HBr by the last sentence of paragraph [0049].

Nelson describes several general advantages at paragraph [0019]-[0022] that are not attributed specifically to Br₂ and that could be referred to by paragraph [0049]'s general reference to "...the advantageous effect of the invention...", such as the ability to remove mercury from a hot mercury-containing combustion gas (expanded on at paragraph [0047]), a flexible and retrofittable method that can be applied to a wide range of equipment configurations (expanded on at paragraph [0042]), simplicity and ease of use (expanded on at paragraphs [0042] and [0044]), and permanent sequestration of the mercury from environmental interactions (expanded on at paragraph [0043]). Paragraphs [0044] and [0053] also describe that elevated temperature during treatment can provide an advantage of reduced physical-adsorption of the elemental bromine or the hydrogen bromide, which helps to avoid emission during handling, storage, and during injection into a hot flue gas. Paragraph [0062] states that mercury sorbents prepared according to Nelson's invention can capture

mercury in at least the lower range of 300 °C to 400 °C. Paragraph [0065] states that injection of the treated activated carbon prior to a fabric filter can provide a longer residence time of the sorbent, higher utilization levels, as well as the possibility of recovering and reinjecting the sorbent at lower costs.

Paragraph [0017] refers to the "...particular advantages of using bromine, rather than iodine or iodides, or chlorine or chlorides, with activated carbon..." but, as explained herein, "...bromine..." would be interpreted as elemental bromine (Br_2); moreover, paragraph [0017] fails to describe or suggest any "...particular advantages of using bromine..." Paragraph [0017]'s concluding statement referring to the "...tenacity of carbon-bromine-mercury complexes..." fails to compare the strength of such complexes to the strength of any other complexes, such as carbon-chlorine-mercury complexes, carbon-chloride-mercury complexes, carbon-iodine-mercury complexes, or carbon-iodide-mercury complexes; therefore, at best, the "...tenacity..." of the complexes described in the last sentence of paragraph [0017] can be regarded as a general statement, rather than as a comparative one.

Paragraph [0041] begins by stating that gaseous bromine (defined as Br_2) or hydrogen bromide (defined as HBr) increases the mercury absorption capacity of activated carbon. Then, paragraph [0041] goes on to explicitly state that gaseous bromine, defined as Br_2 in the prior sentence, produces a more effective mercury-absorbing carbon sorbent than iodine (I_2), iodide (I^-), chlorine (Cl_2), or chloride (Cl^-). With the precise definitions given for gaseous bromine (Br_2) and hydrogen bromide, and then reference only to gaseous bromine (Br_2) in the next sentence, Nelson makes clear that the comparison of efficacy is only with respect to elemental bromine (Br_2) and not hydrogen bromide. Paragraph [0041] fails to describe a general advantage of Nelson's invention; instead, paragraph [0041] specifically and particularly describes an advantage of elemental bromine (Br_2), which cannot be regarded as a general advantageous effect of "...the invention..." as it only applies to elemental bromine (Br_2). Accordingly, advantages explicitly attributed to Br_2 in paragraph [0041] of Nelson cannot be imputed to HBr by the last sentence of paragraph [0049].

Therefore, paragraph [0049] fails to describe or suggest that hydrogen bromide treatment of activated carbons is more effective for mercury removal than HCl or Cl^- treatment of activated carbons.

At paragraph [0050], Nelson states:

[0050] In the liquid form at ambient temperatures, elemental bromine is dense and compact, with advantages in transport and storage. To be utilized in this invention, however, it must first be heated to at least about 60° C. and turned into a gaseous state. In such a state it can more uniformly treat the carbonaceous materials at low levels and provide the desired effect of increasing their mercury sequestration capabilities. A preferred method of converting the liquid bromine to a bromine-containing gas is to use a heated lance. Liquid bromine can be metered into such a heated-lance system at one end and be distributed as a gas to the substrate materials at the other end.

Nelson therefore states that an advantage of elemental bromine (Br_2) is that it is dense and compact which provides advantages in transport and storage.

At paragraph [0051], Nelson states:

[0051] In some applications it may be beneficial to utilize a diluting carrier gas to better distribute the $\text{Br}_2(\text{g})$ or $\text{HBr}(\text{g})$ among the carbonaceous substrate particles. However, if the process of this invention is practiced in a batch mode, it can be preferable to use pure $\text{Br}_2(\text{g})$ or $\text{HBr}(\text{g})$. These can be

Nelson therefore states that elemental bromine (Br_2) or hydrogen bromide can be dispersed in a carrier gas during the treatment of the activated carbon.

At paragraph [0053], Nelson states:

reactive towards mercury. By exposing the carbon to the bromine at an elevated temperature, less of the bromine species will volatilize off from the sorbents during their transport and storage or upon their injection into the hot combustion stream.

Paragraph [0053] describes that elevated temperature during treatment can provide an advantage of reduced volatilization during transport, storage, or during injection into the hot flue gas, expanding on the advantage described at paragraph [0044].

At paragraph [0054], Nelson states:

[0054] Any level of bromination of carbonaceous substrates appears to increase their mercury-removal performance. While over 30 wt % of $\text{Br}_2(\text{g})$ can be adsorbed into some powdered activated carbons, for example, significant increases in mercury reactivity will be observed with only about 1 wt % $\text{Br}_2(\text{g})$ in the PAC. Greater degrees of bromination do correlate with greater maximum mercury capacities for a particular carbonaceous substrate. However, with the sorbent-injection application of this invention, only a fraction of a material's maximum possible mercury capacity is typically utilized, so the optimum level of bromine to combine with the carbon substrate may vary with the particular situation. If a PAC substrate is used, brominating to 1 wt % provides a highly-capable mercury sorbent, although a 5 wt % material performs better and may be preferable. Brominating to 15 wt % Br_2 generally produces an even more capable mercury sorbent, but as some of the bromine is held at less-energetic sites, there is a greater possibility that some degree of bromine may evolve off under some circumstances. Mercury sorbents with higher bromine concentrations will take longer to produce and cost more as well.

Paragraph [0054] refers to bromination of activated carbon, referring only to specific amounts of Br_2 used to treat the activated carbon and not giving any reference to, let alone specific amounts of, hydrogen bromide.

At paragraph [0062], Nelson states:

[0062] FIG. 4 describes the possible application of the sorbents to a plant which has a "hot-side" ESP, a particularly difficult situation for mercury control. In this equipment arrangement, the air preheater 22 follows the ESP 32, so the temperature of the mercury-containing flue gas in the ductwork 64 before the particulate collection is very high, in the range of 300-to-400° C. Plain powdered activated carbons do not capture any mercury at these temperatures and PACs impregnated with iodine or sulfur lose their impregnates. Surprisingly, the mercury sorbents prepared according to the process of this invention appear to capture mercury in at

least the lower end of this temperature range. Consequently, the sorbents from bin 71 can be useful even when injected at 72 into the very hot, low-oxygen, mercury-containing gases in ductwork 64. The sorbents would be collected with the other gas stream particulates in the hot-side ESP 32 and the cleaned gas would proceed through ductwork 65 to the smokestack.

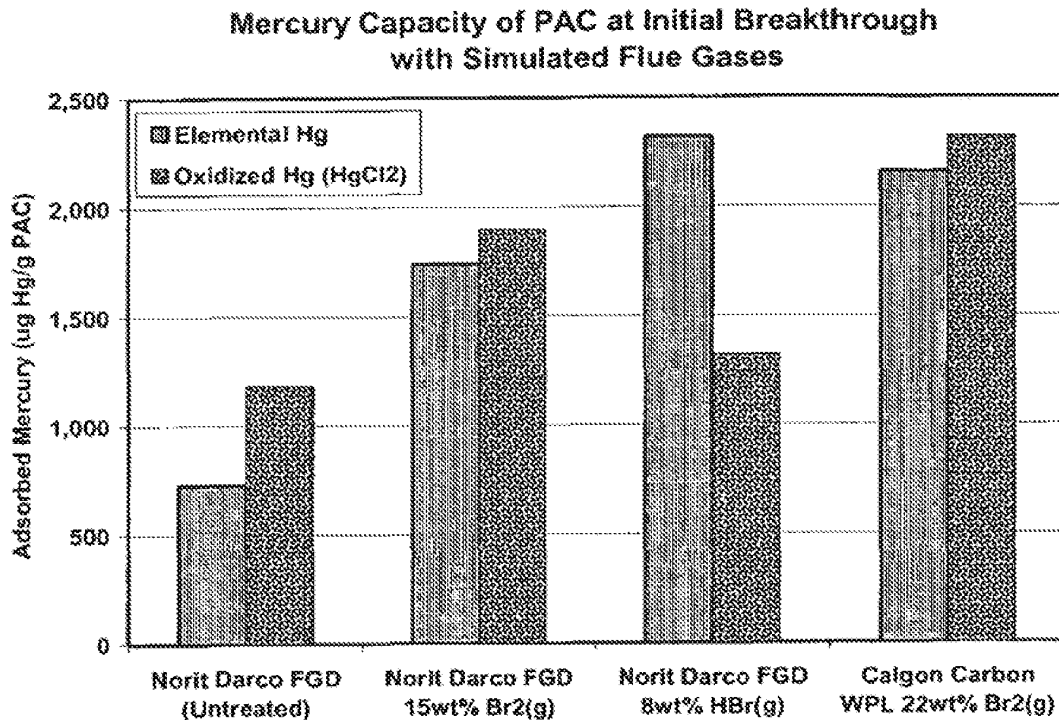
Paragraph [0062] states that mercury sorbents prepared according to Nelson's invention can capture mercury in at least the lower range of 300 °C to 400 °C, unlike activated carbons impregnated with iodine or sulfur.

At paragraph [0065], Nelson states:

[0065] Two such arrangements bear particular mention. FIG. 5 applies the sorbents in a "TOXECON®" arrangement. Here the mercury sorbents 71 are injected after an ESP 32 into the almost particulate-free ductwork 67 before a small, high-velocity fabric filter 33. In this manner the fly ash 80 does not become mixed with the carbonaceous sorbents, allowing the fly ash to be sold for concrete use. Moreover, the filter cake of fabric filter 33 would predominantly be mercury sorbent, allowing a longer residence time, higher utilization levels, and the possibility of recovering and reinjecting the sorbent to lower costs. The superior reactivity and capacities of the mercury sorbents of this invention make them prime candidates for use in such an arrangement.

Paragraph [0065] states that injection of the treated activated carbon prior to a fabric filter can provide a longer residence time of the sorbent, higher utilization levels, as well as the possibility of recovering and reinjecting the sorbent at lower costs.

Figure 12 of Nelson is reproduced below.



Paragraph [0080], discussing figure 12, states that:

...the brominated carbons adsorbed considerably more mercury species than the untreated version, with the improvements averaging about 100%. Importantly, the bromine-gas-treated sorbents removed about as much oxidized mercury-chloride from the test gases as elemental mercury, indicating performance improvements with both kinds of common flue-gas mercury species.

Both of the Br₂-treated activated carbons in figure 12 showed increased removal of both elemental mercury and oxidized mercury as compared to the untreated activated carbon. However, the HBr-treated activated carbon in figure 12 had hardly any improvement in removal of oxidized Hg compared to the untreated activated carbon, which paragraph [0080] describes as one of two common flue-gas mercury species, and that the removal of both of these species is “important.”

The majority of Nelson’s Examples (1-4 and 8) focus only on Br₂. Nelson’s Examples 5-7 demonstrate the use of HBr-treated sorbent; however, none of these Examples or any other parts of Nelson compare the mercury-absorption performance of HBr-treated activated carbon to HCl-treated activated carbon. Although figures 14 and 15 illustrate HBr-treated activated carbon and

Cl₂-treated activated carbon, Cl₂-treated activated carbon is not HCl-treated or Cl⁻-treated carbon and these figures fail to show any comparison to HCl- or Cl⁻-treated activated carbon.

At paragraph [0085], Nelson states:

sorbents of this invention. See FIG. 14. About three times as much chlorine-gas treated PAC was required to achieve the same degree of mercury removal as with bromine. The

Figure 14 of Nelson is reproduced below:

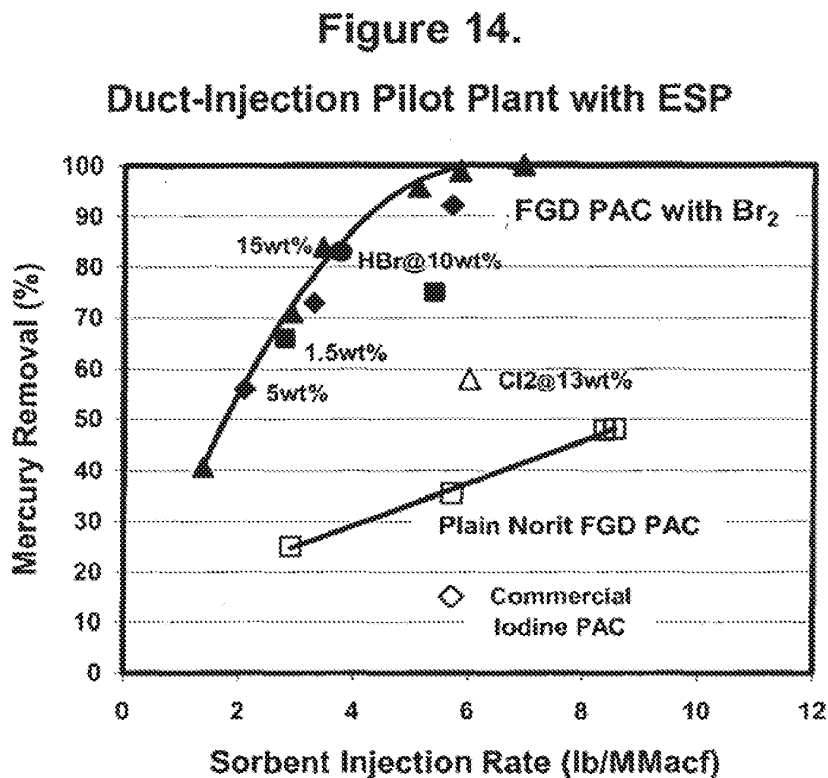


Figure 14 shows mercury removal percent from seven different types of activated carbons: commercial iodine activated carbon, plain Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 10 wt% HBr-treated activated carbon, 1.5 wt% Br₂-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 14 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon). Paragraph [0085] states that about three times as much chlorine-gas treated activated carbon was required to achieve the same degree of mercury removal as with bromine, which can only be a comparison between the 13 wt% Cl₂-treated

activated carbon and the 5 wt% Br₂-treated activated carbon which had a percent mercury removal that was about the same. Further, with regard to figure 14, Nelson states at paragraph [0084] that “[t]here was not much difference in performance between the various brominated samples, probably because in the duct-injection mode they only used a small fraction of their available mercury-adsorption capacity.” Therefore, Nelson states that figure 14 does not provide an accurate comparison between the brominated samples, because the full mercury-adsorption capacity was not utilized.

At paragraph [0087], and the following table, Nelson states:

[0087] Manufacture of the elemental bromine sorbents was much faster than for the others. The elemental bromine was adsorbed and reacted with the PACs much faster than was the elemental chlorine, for example—one-hundred-times faster. This allowed for quick and inexpensive manufacture of these sorbents. See the table below with rate data in terms of grams of gas adsorbed per kilogram of PAC per minute. The PAC adsorption of gaseous hydrogen bromide, HBr(g), was ten times faster than it was for chlorine.

Gaseous Halogen	Final Loading on FGD PAC (wt %)	Adsorption Rate (gm of gas) (kg PAC = min)	Concentration in Storage Vessel (ppm)
Br ₂ (g)	5%	10	0
Br ₂ (g)	15%	10	0.5
HBr (g)	9%	1	N.A.
Cl ₂ (g)	13%	0.1	>40

Paragraph [0087] states that the activated carbon adsorbed elemental bromine (Br₂) and hydrogen bromide (HBr) faster than chlorine (explicitly shown as Cl₂ in the Table). The table shows the amount of treatment material (Br₂, HBr, or Cl₂) absorbed on the activated carbon and the rate of adsorption of the treatment material on the activated carbon. Paragraph [0087] and the table that follows make no statements describing or suggesting mercury removal rates of the treated activated carbon.

Figure 15 of Nelson is reproduced below:

Figure 15.
Lausche Plant Duct-Injection ESP Trials

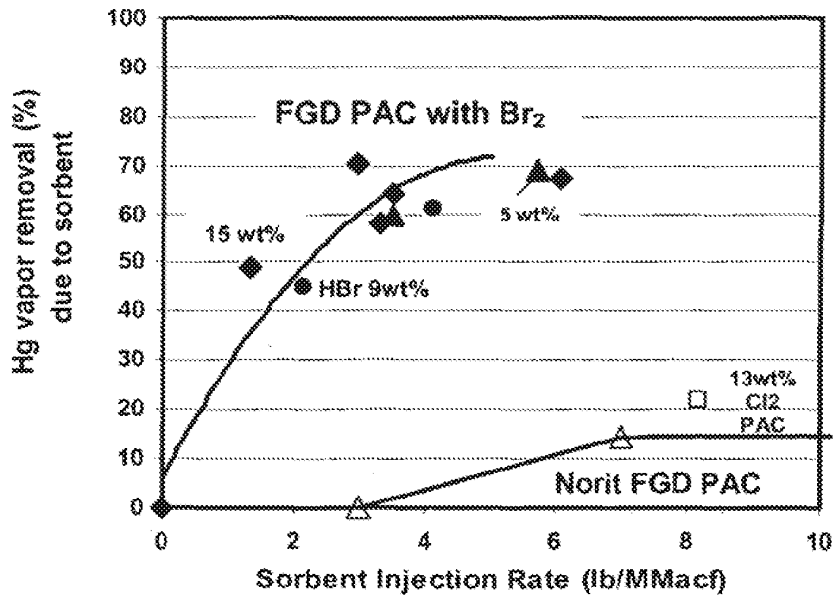


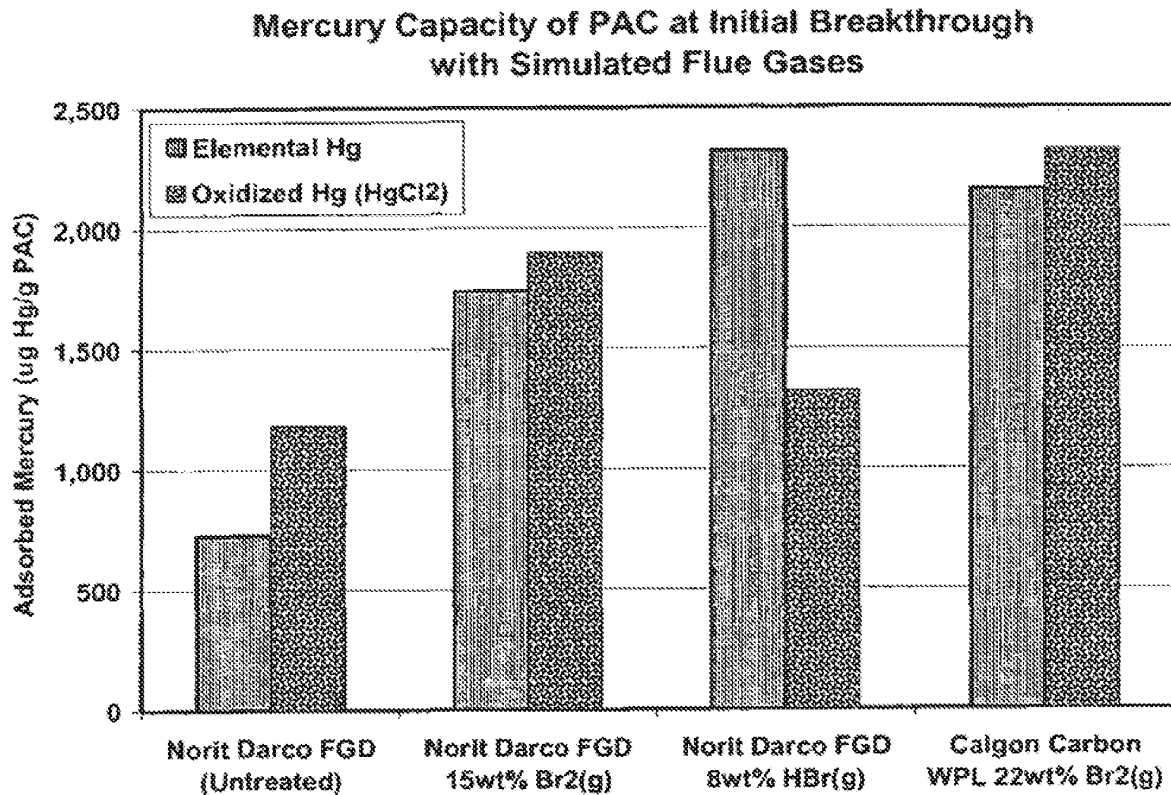
Figure 15 shows mercury removal percent from five different types of activated carbons: Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 9 wt% HBr-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 15 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon). For all data points showing HBr-treated activated carbon, a higher sorbent injection rate was needed to achieve equivalent mercury-removal performance as the Br₂-treated activated carbons (i.e., the HBr data points for a given mercury-removal percentage are always to the right of the Br₂ data points for that mercury-removal percentage), indicating HBr-treated activated carbon to have less mercury-removal ability than Br₂-treated activated carbons.

At paragraph [0092], Nelson states:

[0092] The brominated sorbents of this invention, on the other hand, performed very well with this difficult flue gas, achieving about 50% mercury removal with only 2 lb/MMacf of sorbent consumption and almost 70% removal at an injection rate of 4 lb/MMacf. PACs brominated with Br₂ to 5 wt % and 15 wt %, and with HBr to 9 wt % all performed similarly.

Paragraph [0092] refers to the data shown in Figure 15. However, Figure 15 shows mercury removal percent from five different types of activated carbons: Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 9 wt% HBr-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 15 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon).

Taken in the context of the entire document, figures 14-15 and paragraph [0092] fails to describe or suggest equivalent mercury-removal performance of HBr-treated activated carbon and Br₂-treated activated carbon. With regard to figure 14, Nelson states at paragraph [0084] that “[t]here was not much difference in performance between the various brominated samples, probably because in the duct-injection mode they only used a small fraction of their available mercury-adsorption capacity.” Therefore, Nelson states that figure 14 does not provide an accurate comparison between the brominated samples, because the full mercury-adsorption capacity was not utilized. In figure 15, for all data points showing HBr-treated activated carbon, a higher sorbent injection rate was needed to achieve equivalent mercury-removal performance as the Br₂-treated activated carbons (i.e., the HBr data points for a given mercury-removal percentage are always to the right of the Br₂ data points for that mercury-removal percentage), indicating HBr-treated activated carbon to have less mercury-removal ability than Br₂-treated activated carbons. In figure 12, reproduced below, Nelson compares the mercury capacity of untreated activated carbon, 15 wt% Br₂-treated activated carbon, 8 wt% HBr-treated activated carbon, and 22 wt% Br₂-treated activated carbon.



Paragraph [0080], discussing figure 12, states that:

...the brominated carbons adsorbed considerably more mercury species than the untreated version, with the improvements averaging about 100%. Importantly, the bromine-gas-treated sorbents removed about as much oxidized mercury-chloride from the test gases as elemental mercury, indicating performance improvements with both kinds of common flue-gas mercury species.

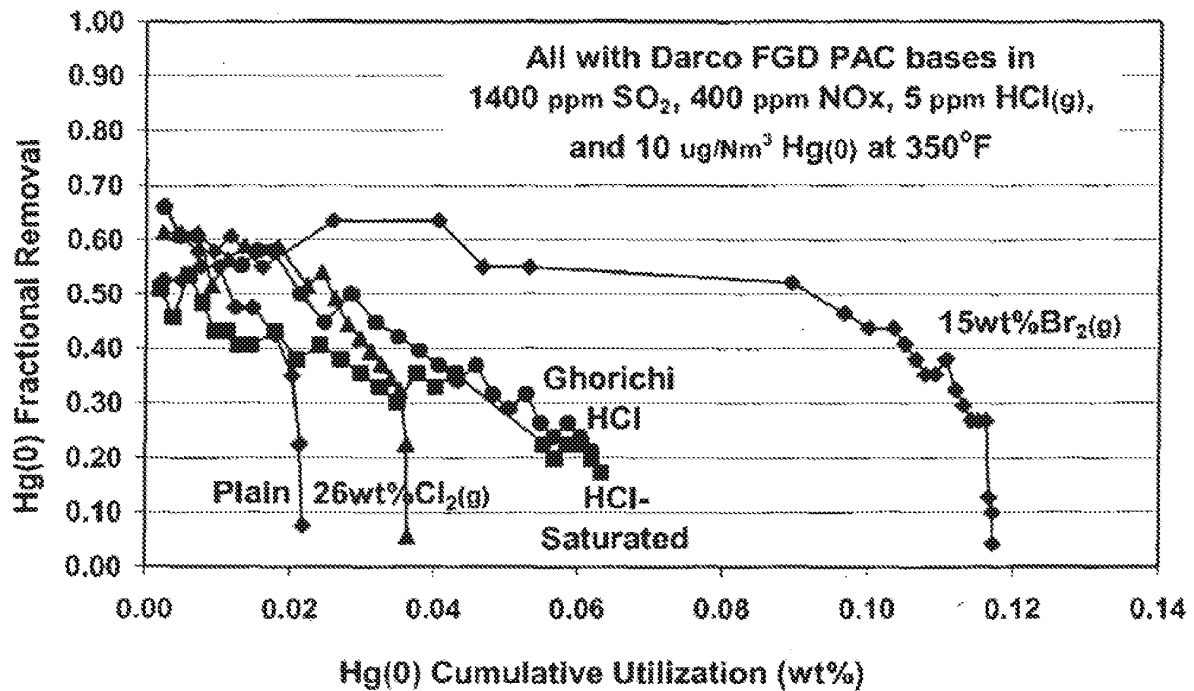
Both of the Br₂-treated activated carbons in figure 12 showed increased removal of both elemental mercury and oxidized mercury as compared to the untreated activated carbon. However, the HBr-treated activated carbon in figure 12 had hardly any improvement in removal of oxidized Hg compared to the untreated activated carbon, which paragraph [0080] describes as one of two common flue-gas mercury species, and that the removal of both of these species is “important.”

Nelson does not portray the mercury removal abilities of activated carbon treated with Cl₂ outside the flue gas as equivalent to that of activated carbon treated with HCl outside the flue gas.

At figure 11, reproduced below, Nelson shows mercury breakthrough curves for elemental mercury removal from a non-flue gas “mercury-challenge gas” for powdered activated carbon with various halogen treatments performed outside the flue gas.

Figure 11.

**Mercury Breakthrough Curves
for PAC with Various Halogen Treatments**



At paragraph [0077], reproduced below, Nelson discusses figure 11.

[0077] The sample that had been exposed to gaseous chlorine, $\text{Cl}_2(\text{g})$, exhibited some improvement in mercury removal performance relative to the plain, untreated PAC. Two samples of HCl-treated PACs showed even higher ultimate mercury capacities, but poorer kinetics. One of these samples had been pretreated by flowing gas-phase HCl through the PAC sample until it no longer added mass. The other, acquired from Ghorishi et al., was produced by a dilute liquid-phase HCl treatment described in their publications. The elemental mercury breakthrough curves of the two HCl-treated PACs were very similar, exhibiting a slow and steady drop-off in performance, indicative of poor mercury adsorption kinetics. In contrast, the brominated sample of this invention broke through very sharply and captured more than five times the elemental mercury of the untreated PAC.

At paragraph [0077], Nelson states that the HCl-treated powdered activated carbons had higher capacities for elemental mercury, but showed poorer kinetics. Although some information about how the Cl_2 - and HCl-treated activated carbons would behave in a flue gas can be learned from figure 11, a flue gas contains additional species that were not present in the “mercury challenge gas”, and, further, can include other forms of mercury other than the elemental mercury measured by the breakthrough test of figure 11, such as oxidized mercury. Nelson does not perform mercury-removal testing of HCl-treated activated carbons in a flue gas. However, Nelson in figure 11, paragraph [0077], and paragraph [0012] refers to HCl-treated activated carbon from Ghorishi et al., which had about the same performance in figure 11 as the HCl-saturated activated carbon prepared by Nelson. At paragraph [0012] Nelson describes a publication by this author, Ghorishi, S.B., Keeney, R.M., Jozewicz, W.S., Serre, S.D. and Gullett, B.K., 2001, In-flight capture of elemental mercury by a chlorine-impregnated activated carbon, Annual Air and Waste Management Association(AWMA) Conference, Orlando, FL, Vol. 24, No. 28 (“Ghorishi”).

Ghorishi’s conclusion at page 11 states that over 80% mercury removal was accomplished from a flue gas using activated carbon treated outside the flue gas with HCl. Comparing these results to Nelson’s results shown in figures 14 and 15, 80% mercury removal is better than the about 58% removal by Cl_2 -treated activated carbon in figure 14, is better than the about 22% removal by Cl_2 -treated activated carbon in figure 15, and is better than the maximum mercury removal of HBr-

or Br₂-treated activated carbons in figure 15. Therefore, one of ordinary skill in the art hypothetically reviewing Nelson would not only conclude that activated carbon treated outside the flue gas with HCl not only has higher capacity for elemental mercury than Cl₂-treated activated carbon as shown in Nelson's figure 11, but also from comparing Ghorishi to Nelson that activated carbon treated outside the flue gas with HCl has better mercury removal performance in flue gas than Cl₂-treated activated carbon. Accordingly, even if, merely for the sake of argument, one of ordinary skill in the art were to conclude from Nelson's statements at paragraph [0092] that activated carbon treated with HBr or Br₂ outside the flue gas have similar mercury removal abilities, this would not lead to the conclusion that activated carbon treated with HBr outside the flue gas has better mercury removal abilities than activated carbon treated with HCl outside the flue gas.

Nelson never directly compares the mercury-removal ability of HBr-treated activated carbon with HCl-treated activated carbon. With Nelson clearly indicating that HBr-treated activated carbon has inferior mercury-removal ability as compared to Br₂-treated activated carbon, and that HCl-treated activated carbon has superior mercury-removal ability as compared to Cl₂-treated activated carbon, there is no way that one of ordinary skill in the art hypothetically considering Nelson could conclude that HBr-treated activated carbon has equivalent or superior mercury-removal ability compared to HCl-treated activated carbon.

No part of Nelson describes or suggests that HBr or Br⁻ even have the same effectiveness for mercury sequestration when used to treat activated carbons as HCl or Cl⁻, let alone that HBr or Br⁻ are more effective for mercury sequestration when used to treat activated carbons than HCl or Cl⁻. A person of ordinary skill in the art would have no reason to modify Felsvang's HCl or Cl⁻ process with a different promoter to form an effective carbon sorbent for mercury removal if the resulting mercury-removal efficiency could not be reasonably predicted to be the same or greater as that of Felsvang's original process. Therefore, a person of ordinary skill in the art would not be motivated to replace Felsvang's HCl or Cl⁻ treatment of activated carbon with Nelson's HBr treatment. Independent claims 66, 79, 81, and 82 are patentable for at least this reason.

I(B). Sing fails to remedy the defects of Nelson and Felsvang.

Sing is toward methods of preparing fibrous activated carbons by carbonizing and activated cellulose fiber. Sing fails to describe or suggest mercury removal. Sing fails to describe or suggest

treatment of activated carbon with halogens or halides. As such, Sing fails to remedy the defects of Felsvang and Nelson described herein at **I(A)**; therefore, independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Sing.

I(C). Responses to the Examiner's responses to arguments made in the last response.

The Office Action states:

The applicant traverses the combination of Felsvang and Nelson combination stating that there is no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process. The applicant contends that one having ordinary skill in the art would not be motivated to replace Felsvang's chloride-treatment with treatment by another material as the prior art does not disclose the bromide additives performing the same or better mercury-removal efficiency.

The examiner disagrees. See Fig. 14 of Nelson which shows that about 3 times the amount of chlorine treated PAC was required to achieve the same degree of mercury removal as with bromine. (paragraph [0085]). Also see the absorption rate in the table on page 8. Further as the rejection above states, Both chlorine and bromine are known within the art to treat activated carbon and therefore it would be well within the capability of one having ordinary skill in the art to *either replace the Cl with or include in addition to the halogen or halide promoter comprising HBr, Br⁻, or a combination thereof to promote activated carbon* (Nelson paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

The Office Action states that Fig. 14 of Nelson shows that about 3 times the amount of chlorine treated PAC was required to achieve the same degree of mercury removal as with bromine, citing to paragraph [0085]. The Office Action also cites to the absorption rate in the table on page 8.

Although figures 14 and 15 illustrate HBr-treated activated carbon and Cl₂-treated activated carbon, Cl₂-treated activated carbon is not HCl- or Cl⁻-treated carbon and these figures fail to show any comparison to HCl- or Cl⁻-treated activated carbon.

At paragraph [0085], Nelson states:

sorbents of this invention. See **FIG. 14**. About three times as much chlorine-gas treated PAC was required to achieve the same degree of mercury removal as with bromine. The

Figure 14 of Nelson is reproduced below:

Figure 14.
Duct-Injection Pilot Plant with ESP

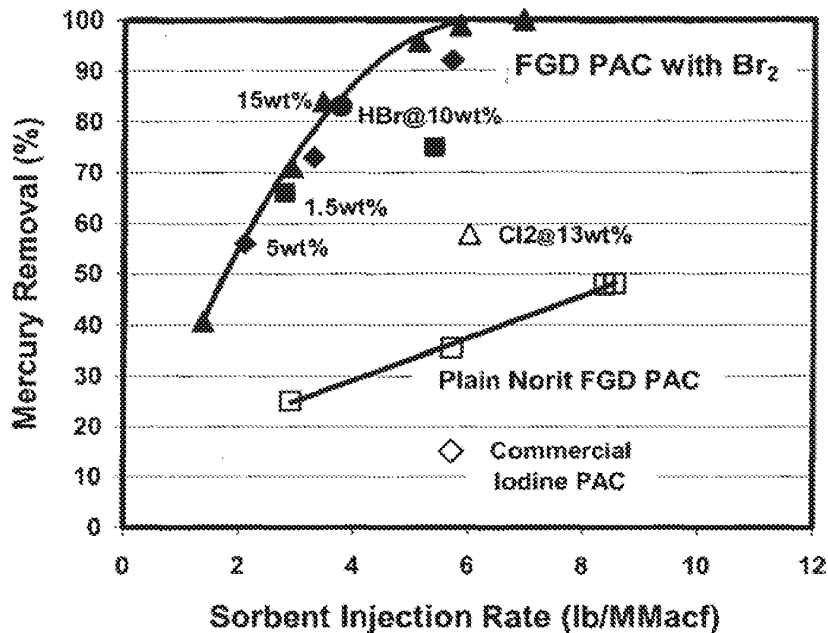


Figure 14 shows mercury removal percent from seven different types of activated carbons: commercial iodine activated carbon, plain Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 10 wt% HBr-treated activated carbon, 1.5 wt% Br₂-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 14 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon). Paragraph [0085] states that about three times as much chlorine-gas treated activated carbon was required to achieve the same degree of mercury removal as with bromine, which can only be a comparison between the 13 wt% Cl₂-treated activated carbon and the 5 wt% Br₂-treated activated carbon which had a percent mercury removal that was about the same.

At paragraph [0017], Nelson states:

[0017] The particular advantages of using bromine, rather than iodine or iodides, or chlorine or chlorides, with activated carbons for mercury control have not been previously appreciated. Gaseous bromine and hydrogen bromide have been combined with carbon substrates before, but not to sequester mercury from hot combustion-gas streams. For example, Greinke U.S. Pat. No. 5,372,619 found that bromine-treated carbon can make a superior natural-gas storage medium. In another example, SKC Inc. sells a small tube with hydrobromic acid-treated charcoal to sample air for ethylene oxide. However, with both of these uses it is important that the adsorption targets, natural gas and ethylene oxide, be easily desorbable from the carbon, the exact opposite of what is required in a mercury vapor sequestration application. In a similar vein, in U.S. Pat. No. 6,475,461 Ohsaki describes a process for treating carbon substrates with gaseous bromine or chlorine, but then explicitly desorbs them to achieve his desired product. Seki U.S. Pat. No. 3,961,020; Yoshida and Seki et al. U.S. Pat. No. 4,174,373; and Knoblauch et al. U.S. Pat. No. 5,179,058 impregnate activated carbon with bromine to produce a catalyst for reacting nitrogen oxide with ammonia to form nitrogen and water. In this application too, the bromine of the carbon does not act as a sequestration agent, permanently tying up its target. Rather, it serves as a catalyst, taking part in a repeated series of desired chemical reactions, but not becoming permanently consumed by any of them. Perhaps it is understandable that the tenacity of carbon-bromine-mercury complexes could be overlooked.

The first sentence of paragraph [0017] refers to the "...particular advantages of using bromine..." for treatment of activated carbons for mercury control, which must mean either elemental bromine (Br_2) or the element bromine generally, and is not a specific reference to bromides (Br^-). The "...particular advantages of using bromine..." is compared to iodine (I_2), iodides (I^-), chlorine (Cl_2), and chlorides (Cl^-), but no specific comparison is made between bromides (Br^-) and chlorides (Cl^-). However, it does not make sense for Nelson to refer to the element bromine generally while specifically distinguishing between chlorine (Cl_2) and chlorides (Cl^-), and iodine (I_2) and iodides (I^-) in the same sentence. If Nelson wanted to compare both

elemental bromine (Br_2) and hydrogen bromide (HBr) to the other halides specifically disclosed in the first sentence, Nelson would have specifically distinguished between bromine (Br_2) and bromides (Br^-); therefore, "...bromine..." in the first sentence of paragraph [0017] would be interpreted as elemental bromine (Br_2), and not as the element bromine generally.

No "...particular advantages of using bromine..." are explicitly described in paragraph [0017], with the remainder of the paragraph focusing on the failure of the prior art to use bromine with activated carbon for mercury control, describing various disadvantages of other processes, such as the desorbability of Br_2 , HBr , or Cl_2 from the activated carbon, or the failure of the Br_2 or HBr to act as a mercury sequestration agent. The paragraph concludes with a statement that it is understandable that "...the tenacity of carbon-bromine-mercury complexes..." could be overlooked, which must refer to complexes including either elemental bromine (Br_2) or the element bromine generally, with no specific reference to bromide (Br^-) or complexes formed therefrom. The concluding statement of paragraph [0017] is directed toward the discussion in the bulk of paragraph [0017]—the prior art fails to use bromine with activated carbon for mercury control and therefore fails to generate carbon-bromine-mercury complexes—rather than as a statement of any relative advantage of bromine over other halogens or halides. The "...tenacity of carbon-bromine-mercury complexes..." is not specifically compared to the strength of any other complexes, such as carbon-chlorine-mercury complexes, carbon-chloride-mercury complexes, carbon-iodine-mercury complexes, or carbon-iodide-mercury complexes; therefore, at best, the "...tenacity..." of the complexes described in the last sentence of paragraph [0017] can be regarded as a general statement, rather than as a comparative one. Paragraph [0017] fails to attribute any advantage of Nelson's invention specifically to HBr or Br^- , and, moreover, fails to describe or suggest that HBr or Br^- treatment of activated carbon could provide equal, let alone better, mercury removal than HCl or Cl^- treatment of the activated carbon.

At paragraph [0044], Nelson states:

[0044] Production of the new mercury sorbent materials is simple and inexpensive. The carbon material and the bromine gas need simply be contacted with each other for the advantageous mercury-reactive surface compounds to quickly form. Elemental bromine is a liquid at ambient temperature, but turns to a gas at only a modestly elevated temperature. Hydrogen bromide is a gas at even ambient temperature. Using a gas-phase carbon reactant considerably simplifies the production of the sorbent and leads to the low costs which are a requirement for a sorbent to be used as a once-through duct injectant. Any common mixing method and equipment can be use to contact the gaseous bromine species with the carbon-based substrates, although it is preferably lined with corrosion-resistant material, because the bromine species can be quite corrosive. It is also preferable that the mixing of bromine gas and carbon be done at an elevated temperature. This keeps the bromine gas in the gaseous form, but also minimizes the amount of any bromine physically-adsorbed into the pores of the carbon. Such physically adsorbed bromine is not chemically bound to the carbon lattice and can be emitted in handling, in storage, and especially, when the sorbent is injected into a hot flue gas.

Paragraph [0044] expands on the general advantage described in paragraph [0021] of simple and inexpensive generation and use of the treated activated carbon sorbent. Paragraph [0044] also describes that elevated temperature during treatment can provide an advantage of reduced physical-adsorption of the elemental bromine or the hydrogen bromide, which helps to avoid emission during handling, storage, and during injection into a hot flue gas. The advantages are not described or suggested to include equal or greater mercury-removal ability of HBr- or Br⁻-treated activated carbon as compared to HCl- or Cl⁻-treated activated carbon.

The Office Action states:

The applicant contends that the Nelson reference does not disclose HBr and Br₂ being more effect with activated carbons than chlorides.

The examiner disagrees. The Nelson reference discloses that HBr is used to provide bromide to the system. Example 5, paragraph [0083] states that the brominated PACs were treated with HBr or Br₂. Figures 14 and 15 disclose that HBr-treated PAC performs better than chlorine-treated PAC. Further one having ordinary skill in the art would expect PAC treated with HBr or Br₂ would result in a very similar modified PAC as they both include bromide (see paragraph [0092] which discloses that each of the brominated PACs performed similarly). The examiner also points to paragraph [0087] of Nelson which discloses that PAC adsorption of gaseous hydrogen bromide being ten times faster than it was for chlorine.

The Office Action states that the Nelson reference discloses that HBr is used to provide bromide to the system, and that Example 5, paragraph [0083] states that brominated PACs were treated with HBr or Br₂. Applicant cannot find the language of providing HBr “to the system” in Nelson; paragraph [0083] in Example 5 describes treating powdered activated carbons with different amounts of gaseous Br₂(g) or HBr prior to injecting the activated carbons into the flue gas. However, Nelson fails to describe or suggest that treatment of activated carbon with HBr provides the same, let alone better, mercury removal efficiency as activated carbon treated with HCl or Cl⁻.

With regard to figures 14 and 15, as explained above, although figures 14 and 15 illustrate HBr-treated activated carbon and Cl₂-treated activated carbon, Cl₂-treated activated carbon is not HCl- or Cl⁻-treated carbon and these figures fail to show any comparison to HCl- or Cl⁻-treated activated carbon. Figure 14 shows mercury removal percent from seven different types of activated carbons: commercial iodine activated carbon, plain Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 10 wt% HBr-treated activated carbon, 1.5 wt% Br₂-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 14 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon). Paragraph [0085] states that about three times as much chlorine-gas treated activated carbon was required to achieve the same degree of mercury removal as with bromine, which can only be a comparison between the 13 wt% Cl₂-treated activated carbon and the 5 wt% Br₂-treated activated carbon which had a percent mercury removal that was about the same. Figure 15 shows mercury removal percent from five different types of

activated carbons: Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 9 wt% HBr-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 15 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon).

The Office Action states that paragraph [0087] of Nelson discloses that PAC adsorption of gaseous hydrogen bromide was ten times faster than it was for chlorine. At paragraph [0087], and the following table, Nelson states:

[0087] Manufacture of the elemental bromine sorbents was much faster than for the others. The elemental bromine was adsorbed and reacted with the PACs much faster than was the elemental chlorine, for example—one-hundred-times faster. This allowed for quick and inexpensive manufacture of these sorbents. See the table below with rate data in terms of grams of gas adsorbed per kilogram of PAC per minute. The PAC adsorption of gaseous hydrogen bromide, HBr(g), was ten times faster than it was for chlorine.

Gaseous Halogen	Final Loading on FGD PAC (wt %)	Adsorption Rate (gm of gas) (kg PAC = min)	Concentration in Storage Vessel (ppm)
Br ₂ (g)	5%	10	0
Br ₂ (g)	15%	10	0.5
HBr (g)	9%	1	N.A.
Cl ₂ (g)	13%	0.1	>40

Paragraph [0087] states that the activated carbon adsorbed elemental bromine (Br₂) and hydrogen bromide (HBr) faster than chlorine (explicitly shown as Cl₂ in the Table). The table shows the amount of treatment material (Br₂, HBr, or Cl₂) absorbed on the activated carbon and the rate of adsorption of the treatment material on the activated carbon. Paragraph [0087] and the table that follows make no statements describing or suggesting mercury removal rates of the treated activated carbon.

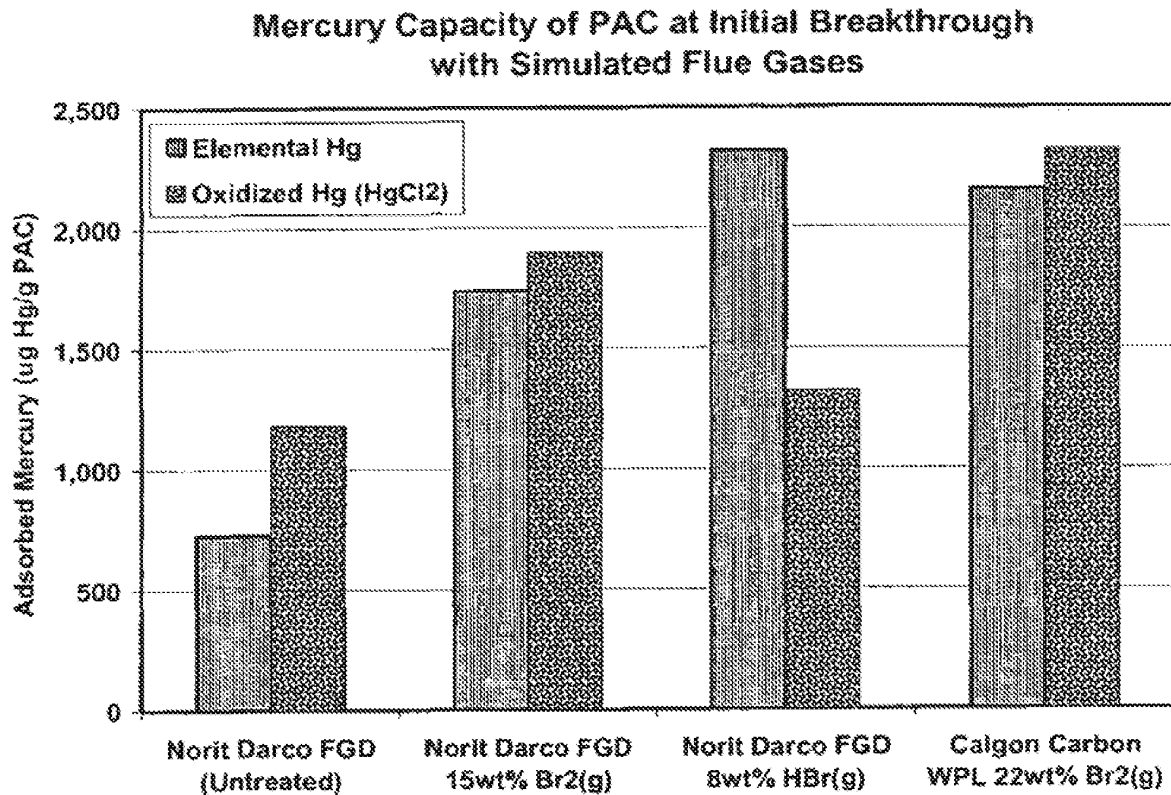
The Office Action states that one having ordinary skill in the art would expect activated carbon treated with HBr or Br₂ would result in a very similar modified PAC as they both include bromide, citing to paragraph [0092] as allegedly disclosing that each of the brominated PACs

performed similarly. Applicant notes that Br₂ is not and does not include Br⁻. At paragraph [0092], Nelson states:

[0092] The brominated sorbents of this invention, on the other hand, performed very well with this difficult flue gas, achieving about 50% mercury removal with only 2 lb/MMacf of sorbent consumption and almost 70% removal at an injection rate of 4 lb/MMacf. PACs brominated with Br₂ to 5 wt % and 15 wt %, and with HBr to 9 wt % all performed similarly.

Paragraph [0092] refers to the data shown in Figure 15. However, Figure 15 shows mercury removal percent from five different types of activated carbons: Norit activated carbon, 13 wt% Cl₂-treated activated carbon, 9 wt% HBr-treated activated carbon, 5 wt% Br₂-treated activated carbon, and 15 wt% Br₂-treated activated carbon. No HCl- or Cl⁻-treated activated carbon is shown in Figure 15 or described in any of Examples 5-7 (the only Examples demonstrating the use of HBr-treated activated carbon).

Taken in the context of the entire document, figures 14-15 and paragraph [0092] fails to describe or suggest equivalent mercury-removal performance of HBr-treated activated carbon and Br₂-treated activated carbon. With regard to figure 14, Nelson states at paragraph [0084] that “[t]here was no much difference in performance between the various brominated samples, probably because in the duct-injection mode they only used a small fraction of their available mercury-adsorption capacity.” Therefore, Nelson states that figure 14 does not provide an accurate comparison between the brominated samples, because the full mercury-adsorption capacity was not utilized. In figure 15, for all data points showing HBr-treated activated carbon, a higher sorbent injection rate was needed to achieve equivalent mercury-removal performance as the Br₂-treated activated carbons (i.e., the HBr data points for a given mercury-removal percentage are always to the right of the Br₂ data points for that mercury-removal percentage), indicating HBr-treated activated carbon to have less mercury-removal ability than Br₂-treated activated carbons. In figure 12, reproduced below, Nelson compares the mercury capacity of untreated activated carbon, 15 wt% Br₂-treated activated carbon, 8 wt% HBr-treated activated carbon, and 22 wt% Br₂-treated activated carbon.



Paragraph [0080], discussing figure 12, states that:

...the brominated carbons adsorbed considerably more mercury species than the untreated version, with the improvements averaging about 100%. Importantly, the bromine-gas-treated sorbents removed about as much oxidized mercury-chloride from the test gases as elemental mercury, indicating performance improvements with both kinds of common flue-gas mercury species.

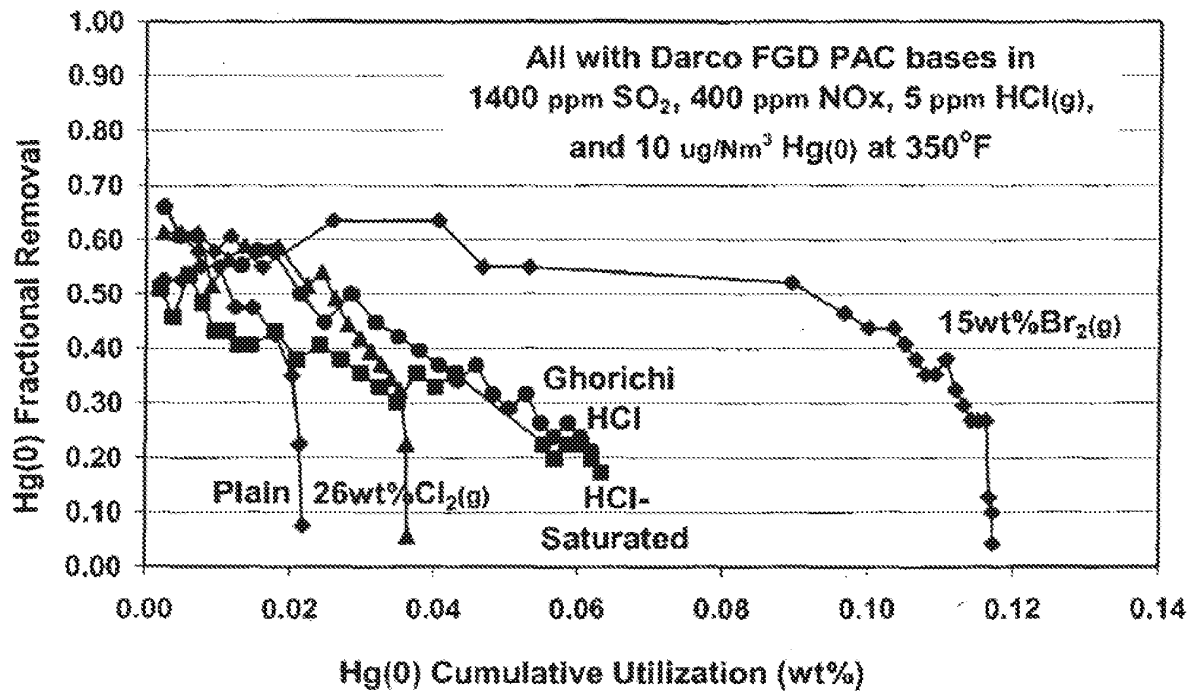
Both of the Br₂-treated activated carbons in figure 12 showed increased removal of both elemental mercury and oxidized mercury as compared to the untreated activated carbon. However, the HBr-treated activated carbon in figure 12 had hardly any improvement in removal of oxidized Hg compared to the untreated activated carbon, which paragraph [0080] describes as one of two common flue-gas mercury species, and that the removal of both of these species is “important.”

Nelson does not portray the mercury removal abilities of activated carbon treated with Cl₂ outside the flue gas as equivalent to that of activated carbon treated with HCl outside the flue gas.

At figure 11, reproduced below, Nelson shows mercury breakthrough curves for elemental mercury removal from a non-flue gas “mercury-challenge gas” for powdered activated carbon with various halogen treatments performed outside the flue gas.

Figure 11.

**Mercury Breakthrough Curves
for PAC with Various Halogen Treatments**



At paragraph [0077], reproduced below, Nelson discusses figure 11.

[0077] The sample that had been exposed to gaseous chlorine, $\text{Cl}_2(\text{g})$, exhibited some improvement in mercury removal performance relative to the plain, untreated PAC. Two samples of HCl-treated PACs showed even higher ultimate mercury capacities, but poorer kinetics. One of these samples had been pretreated by flowing gas-phase HCl through the PAC sample until it no longer added mass. The other, acquired from Ghorishi et al., was produced by a dilute liquid-phase HCl treatment described in their publications. The elemental mercury breakthrough curves of the two HCl-treated PACs were very similar, exhibiting a slow and steady drop-off in performance, indicative of poor mercury adsorption kinetics. In contrast, the brominated sample of this invention broke through very sharply and captured more than five times the elemental mercury of the untreated PAC.

At paragraph [0077], Nelson states that the HCl-treated powdered activated carbons had higher capacities for elemental mercury, but showed poorer kinetics. Although some information about how the Cl_2 - and HCl-treated activated carbons would behave in a flue gas can be learned from figure 11, a flue gas contains additional species that were not present in the “mercury challenge gas”, and, further, can include other forms of mercury other than the elemental mercury measured by the breakthrough test of figure 11, such as oxidized mercury. Nelson does not perform mercury-removal testing of HCl-treated activated carbons in a flue gas. However, Nelson in figure 11, paragraph [0077], and paragraph [0012] refers to HCl-treated activated carbon from Ghorishi et al., which had about the same performance in figure 11 as the HCl-saturated activated carbon prepared by Nelson. At paragraph [0012] Nelson describes a publication by this author, Ghorishi, S.B., Keeney, R.M., Jozewicz, W.S., Serre, S.D. and Gullett, B.K., 2001, In-flight capture of elemental mercury by a chlorine-impregnated activated carbon, Annual Air and Waste Management Association(AWMA) Conference, Orlando, FL, Vol. 24, No. 28 (“Ghorishi”).

Ghorishi’s conclusion at page 11 states that over 80% mercury removal was accomplished from a flue gas using activated carbon treated outside the flue gas with HCl. Comparing these results to Nelson’s results shown in figures 14 and 15, 80% mercury removal is better than the about 58% removal by Cl_2 -treated activated carbon in figure 14, is better than the about 22% removal by Cl_2 -treated activated carbon in figure 15, and is better than the maximum mercury removal of HBr-

or Br₂-treated activated carbons in figure 15. Therefore, one of ordinary skill in the art hypothetically reviewing Nelson would not only conclude that activated carbon treated outside the flue gas with HCl not only has higher capacity for elemental mercury than Cl₂-treated activated carbon as shown in Nelson's figure 11, but also from comparing Ghorishi to Nelson that activated carbon treated outside the flue gas with HCl has better mercury removal performance in flue gas than Cl₂-treated activated carbon. Accordingly, even if, merely for the sake of argument, one of ordinary skill in the art were to conclude from Nelson's statements at paragraph [0092] that activated carbon treated with HBr or Br₂ outside the flue gas have similar mercury removal abilities, this would not lead to the conclusion that activated carbon treated with HBr outside the flue gas has better mercury removal abilities than activated carbon treated with HCl outside the flue gas.

Nelson never directly compares the mercury-removal ability of HBr-treated activated carbon with HCl-treated activated carbon. With Nelson clearly indicating that HBr-treated activated carbon has inferior mercury-removal ability as compared to Br₂-treated activated carbon, and that HCl-treated activated carbon has superior mercury-removal ability as compared to Cl₂-treated activated carbon, there is no way that one of ordinary skill in the art hypothetically considering Nelson could conclude that HBr-treated activated carbon has equivalent or superior mercury-removal ability compared to HCl-treated activated carbon.

Dependent claims 67-77 and 80 are directly or indirectly dependent on independent claims 66 or 79. As such, these dependent claims incorporate all the features of claims 66 or 79. Accordingly, claims 67-77 and 80 are patentable for at least the reasons given herein for patentability of independent claims 66 or 79.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 66-77 and 79-82 under 35 U.S.C. § 103(a) over Felsvang in view Nelson and Sing.

II. The Office Action rejected claim 78 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 ("Felsvang") in view of U.S. patent application no. 2004/0003716 ("Nelson"), U.S. patent no. 4,699,896 ("Sing"), and U.S. patent no. 6,848,374 ("Srinivasachar").

This rejection is respectfully traversed.

As explained herein at **I**, independent claim 66 is patentable over Felsvang, Nelson, and Sing. Srinivasachar mentions treating activated carbon with halide salts or halogen acids prior to placing the activated carbon into flue gas. See, col. 6, lines 2-20. However, like Nelson, Srinivasachar fails to describe or suggest promotion of activated carbon in flue gas, and also fails to describe or suggest that HBr or Br⁻ have the same or greater effectiveness for mercury removal when used to treat activated carbons than chlorides. Accordingly, there would be no motivation for a person of ordinary skill in the art to use Srinivasachar's or Nelson's bromide additives in Felsvang's process. As such, Srinivasachar fails to remedy the deficiencies of Felsvang, Nelson, and Sing. Therefore, independent claim 66 is patentable over Felsvang in view of Nelson, Sing, and Srinivasachar.

Dependent claim 78 is indirectly dependent on independent claim 66. As such, this dependent claim incorporates all the features of claim 66. Accordingly, dependent claim 78 is patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 78 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson, Sing, and Srinivasachar.

III. The Office Action rejected claims 66-77 and 79-82 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 ("Felsvang") in view of U.S. patent application no. 2004/0003716 ("Nelson") and U.S. 6,103,205 ("Wojtowicz").

This rejection is respectfully traversed.

As explained herein at **I**, independent claims 66, 79, 81, and 82 are patentable over Felsvang and Nelson. Wojtowicz is toward removal of mercury from a gas using activated carbon formed from pyrolysis char. Wojtowicz fails to describe or suggest treatment of activated carbon with a halogen or halide outside the flue gas, and also fails to describe or suggest in-flight promotion of activated carbon with a halogen or halide in the flue gas. As such, Wojtowicz fails to remedy the defects of Felsvang and Nelson described herein at **I**; therefore, independent claims 66, 79, 81, and 82 are patentable over Felsvang in view of Nelson and Wojtowicz.

Dependent claims 67-77 and 80 are directly or indirectly dependent on independent claims 66 or 79. As such, these dependent claims incorporate all the features of claims 66 or 79.

Accordingly, claims 67-77 and 80 are patentable for at least the reasons given herein for patentability of independent claims 66 or 79.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 66-77 and 79-82 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson and Wojtowicz.

IV. The Office Action rejected claim 78 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 ("Felsvang") in view of U.S. patent application no. 2004/0003716 ("Nelson"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 6,848,374 ("Srinivasachar").

This rejection is respectfully traversed.

As explained herein at **III**, independent claim 66 is patentable over Felsvang, Nelson, and Wojtowicz. As explained herein at **II**, like Wojtowicz, Srinivasachar also fails to remedy the deficiencies of Felsvang and Nelson; therefore, independent claim 66 is patentable over Felsvang in view of Nelson, Wojtowicz, and Srinivasachar.

Dependent claim 78 is indirectly dependent on independent claim 66. As such, this dependent claim incorporates all the features of claim 66. Accordingly, dependent claim 78 is patentable for at least the reasons given herein for patentability of independent claim 66.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 78 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson, Wojtowicz, and Srinivasachar.

Double Patenting Rejections

V(A). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-30 of U.S. patent no. 7,435,286 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-30 of U.S. patent no. 7,435,286 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(B). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-25 of U.S. patent no. 8,168,147 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-25 of U.S. patent no. 8,168,147 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(C). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-60 of U.S. patent no. 8,512,655 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-60 of U.S. patent no. 8,512,655 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(D). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. patent no. 8,821,819 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-60 of U.S. patent no. 8,821,819 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(E). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-33 of U.S. patent no. 9,757,689 in view of U.S. patent no. 5,435,980 ("Felsvang").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-33 of U.S. patent no. 9,757,689 in view of Felsvang.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(F). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of U.S. patent no. 9,468,886 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of U.S. patent no. 9,468,886 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(G). The Office Action rejected claims 66-82 on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. patent no. 8,652,235 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-30 of U.S. patent no. 8,652,235 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(H). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-16 of copending application no. 15/295,594 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-16 of copending application no. 15/295,594 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(I). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 8-20 of copending application no. 15/589,359 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 8-20 of copending application no. 15/589,359 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(J). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/853,029 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/853,029 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time

inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(K). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/978,760 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/978,760 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(L). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending application no. 15/951,970 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/951,970 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(M). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/382,114 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending application no. 15/382,114 in view of Felsvang, Wojtowicz and Sing.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

V(N). The Office Action provisionally rejected claims 66-82 on the ground of nonstatutory double patenting over claims 1-20 of copending Application No. 15/853,029 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-82 are obvious over claims 1-20 of copending Application No. 15/853,029 in view of Felsvang, Wojtowicz and Sing. This rejection appears to be a duplicate of the rejection listed herein at V(J).

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date July 10, 2019

By Nicholas P. Lanzatella

Nicholas P. Lanzatella
Reg. No. 63,803

IN THE CLAIMS

Please amend the claims as follows:

1.-65. (Canceled)

66. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and an additive comprising HBr, a bromide compound, or a combination thereof-promoter, to form the mercury-containing gas, ~~wherein the promoter comprises HBr, Br⁻, or a combination thereof~~; and

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

67. (Currently Amended) The method of claim 66, wherein the pyrolysis char is a promoted pyrolysis char ~~that is promoted by the promoter~~.

68. (Currently Amended) The method of claim 66, wherein the pyrolysis char and the ~~promoter~~additive are added prior to a combustor that combusts the mixture, within the combustor, or a combination thereof.

69. (Currently Amended) The method of claim 66, wherein the pyrolysis char and the ~~promoter~~additive are added within a combustor that combusts the mixture.

70. (Previously Presented) The method of claim 66, further comprising using a particle separation device to remove mercury from the flue gas and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas.

71. (Currently Amended) The method of claim 70, ~~wherein the method is a method for reducing mercury in the mercury-containing gas to a desired level, the method further comprising:~~

~~monitoring~~ measuring the mercury content of the ~~cleaned gas~~ mercury-containing gas; and

~~controlling~~ modifying, in response to the ~~monitored~~ measured mercury content of the ~~cleaned gas~~, ~~a rate of adding the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof,~~

an injection rate of injecting the sorbent into the mercury-containing gas,

an amount of the additive in the mixture, or

a combination thereof

~~so that the mercury content of the cleaned gas is maintained at or below the desired level.~~

72. (Currently Amended) The method of claim 66, wherein the ~~promoter~~ additive further comprises Br₂.

73. (Previously Presented) The method of claim 66, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.

74. (Previously Presented) The method of claim 66, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.

75. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.

76. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.

77. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

78. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

79. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor comprising pyrolysis char and an additive comprising HBr, a bromide compound, or a combination thereof~~-promoter~~, to form the mercury-containing gas,
~~wherein the promoter comprises HBr, Br₂, or a combination thereof,~~

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

80. (Currently Amended) The method of claim 79, wherein the pyrolysis char is a promoted pyrolysis char~~that has been promoted by the promoter.~~

81. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor and adding within the combustor a pyrolysis char promoted by an additive comprising HBr, a bromide compound, or a combination thereof~~-promoter~~, to form the mercury-containing gas,
~~wherein the promoter comprises HBr, Br₂, or a combination thereof,~~
and

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

82. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and an additive comprising HBr, a bromide compound, or a combination thereof-promoter, to form the mercury-containing gas, ~~wherein the promoter comprises HBr, Br⁻, or a combination thereof;~~ and adding a sorbent material comprising activated carbon into the mercury-containing gas.

83. (New) The method of claim 66, further comprising modifying, in response to a measured mercury content, an injection rate of injecting the sorbent into the mercury-containing gas, an amount of the additive in the mixture, or a combination thereof.

84. (New) The method of claim 66, wherein the coal comprises added sorbent enhancement additive that comprises the bromide compound.

85. (New) The method of claim 66, wherein the coal is combusted in a combustion chamber at a coal-combustion facility, wherein the HBr, bromide compound, or combination thereof, is added to the coal before the coal enters the combustion chamber, wherein the addition of the HBr, bromide compound, or combination thereof, to the coal is performed at the coal-combustion facility.

86. (New) The method of claim 66, wherein the coal is combusted in a combustion chamber at a coal-combustion facility, wherein the HBr, bromide compound, or combination thereof, is added to the coal before the coal enters the combustion chamber, wherein the addition of the HBr, bromide compound, or combination thereof, to the coal is performed at a site other than the coal-combustion facility.

87. (New) The method of claim 66, wherein the sorbent is contacted with a halogen or halide promoter prior to the addition of the sorbent to the mercury-containing gas.

88. (New) The method of claim 66, wherein the sorbent is free of contact with a halogen or halide promoter prior to the addition of the sorbent to the mercury-containing gas.

89. (New) The method of claim 71, wherein the measurement of the mercury content of the mercury-containing gas comprises continuous measurement.

90. (New) The method of claim 66, wherein the coal comprises subbituminous coal.

91. (New) The method of claim 66, wherein the coal comprises lignite coal.

92. (New) The method of claim 66, wherein the mixture is combusted in a combustion chamber of a coal-combustion facility upstream of a scrubber, a particulate control system, or a combination thereof, wherein the particulate sorbent is added to the mercury-containing gas before the mercury-containing gas encounters the scrubber, the particulate control system, or the combination thereof.

93. (New) The method of claim 91, wherein the particulate control system comprises an electrostatic precipitator, a baghouse, a fabric filter, or a combination thereof.

94. (New) The method of claim 84, wherein the combustion chamber is a coal combustion furnace.

A/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Application No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.116

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

Applicant has received the Final Office Action dated January 11, 2019. Please enter the following.

This response is accompanied by a Petition, as well as the appropriate fee, to obtain a three-month extension of the period for responding to the Office Action, thereby moving the deadline for response from April 11, 2019 to July 11, 2019.



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	09/12/2019		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			09/12/2019	ELECTRONIC

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

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

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

SLW@blackhillsip.com
uspto@slwip.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(I)(1) - 706.02(I)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed

determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. US 7,435,286 ('286) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '286 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '286 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-25 of U.S. Patent No. US 8,168,147 ('147) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '147 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '147 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,512,655 ('655) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '655 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '655 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,821,819 ('819) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '819 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '819 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-33 of U.S. Patent No. US 9,757,689 ('689) in view of Felsvang et al. US 5,435,980.

The current claim set corresponds to '689 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. reference disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '689 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. US 9,468,886 ('886) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '886 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '886 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. 8,652,235 ('235) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '235 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '235 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-16 of copending Application No. 15/295594 ('594) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '594 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '594 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 8-20 of copending Application No. 15/589359 ('359) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '359 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '359 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so

as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Wojtowicz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '029 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowicz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same

function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/978/760 ('760) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '760 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '760 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/951970 ('970) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '970 except for combusting a mixture comprising coal, pyrolysis char.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '970 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Felsvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/382114 ('114) in view of Felsvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '114 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Felsvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '114 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Feisvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 66-94 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/853029 ('029) in view of Feisvang et al. US 5,435,980 and Wojtowizz US 6,103,205/Sing et al. US 4,699,896.

The current claim set corresponds to '029 except for combusting a mixture comprising coal, pyrolysis char, and a promoter.

Feisvang et al. and Singer/Wojtowizz references disclose these limitations as shown previously.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include combusting a mixture comprising coal, pyrolysis char, and a promoter (Feisvang et al. column 5, 60-65 and column 4, lines 42-45) so as to supplement the chlorine content of the system so as to increase the mercury sorption capability and provide a less expensive and/or better capacity sorbent.

Further courts have held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Also the courts have held that merely arranging old elements with each performing the same function it has been known to perform and yields no more than one would expect from such an arrangement, then it is obvious. *Id.* at 417, 82 USPQ2d at 1395-96.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

Application/Control Number: 14/712,558
Art Unit: 1776

Page 14

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

Search Notes 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	06/27/2017	AO

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
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	12/01/2017	AO
Inventor Search (DAV)	12/01/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	06/25/2018	AO
Text Search in EAST for sorbents added throughout the system and pyrolysis char (EAST).	10/16/2018	AO
IDS Search (EAST and DAV)	01/07/2019	AO
EAST Text Search	01/07/2019	AO

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

<i>Search Notes</i> 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	SEE EAST SEARCH HISTORY	09/09/2019	AO

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 2		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS				
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			T 1
	"Application Serial No. 15/295,594, Response filed 4-23-19 to Non Final Office Action mailed 10-23-18", 45 pgs			
	"Application Serial No. 15/382,114, Response filed 3-12-19 to Non Final Office Action mailed 12-12-18", 24 pgs			
	"Application Serial No. 15/589,359, Final Office Action mailed 03-01-19", 10 pgs			
	"Application Serial No. 15/589,359, Response filed 04-30-19 to Final Office Action mailed 03-01-19", 11 pgs.			
	"Application Serial No. 15/978,760, Ex Parte Quayle Action mailed 04-19-19", 13 pgs			
	"Application Serial No. 15/978,760, Response filed 03-20-19 to Final Office Action mailed 12-26-18", 90 pgs.			
	"Application Serial No. 15/978,760, Response filed 4-23-19 to Ex Parte Quayle Action mailed 04-19-19", 15 pgs			
	"Coal Combustion Products (CCPs): Characteristics, Utilization and Beneficiation", Edited by Tom Robl, et al., Woodhead Publishing (Elsevier), (2017), 565 pgs			
	"Control of Mercury Emissions from Coal Fired Electric Utility Boilers: An Update", US EPA Air Pollution Prevention and Control Division, National Risk Management Research Laboratory, Office of Research and Development, (February 18, 2005), 59 pgs			
	"Sorbent Enhancement Additives for Mercury Control", US DOE Office of Fossil Energy, National Energy Technology Laboratory, (June 2008), 4 pgs			
	BENSON, STEVEN A., et al., "JV Task 73 - Mercury Control Technologies for Electric Utilities Burning Subbituminous Coals - Draft Final Report", University of North Dakota Energy and Environmental Research Center, (June 2005), 165 pgs			
	BENSON, STEVEN A., et al., "Pilot-and Full-Scale Demonstration of Advanced Mercury Control Technologies for Lignite-Fired Power Plants", University of North Dakota Energy and Environmental Research Center, (February 2005), 97 pgs			
	BERRY, MARK, et al., "Mercury control evaluation of calcium bromide injection into a PRB-fired furnace with an SCR", Proc. of the Air Quality VI Conference, Arlington, VA, (2007), 9 pgs			

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 09/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 2	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	BROWN, THOMAS D., et al., "Mercury Measurement and Its Control: What We Know, Have Learned, and Need to Further Investigate", Journal of the Air and Waste Management Association, 49(6), (June 1999), 98 pgs	
	FEELEY, THOMAS J., et al., "A Review of DOE/NETL's Mercury Control Technology R and D Program for Coal-Fired Power Plants", DOE/NETL Hg R and D Program Review, (April 2003), 32 pgs	
	FRENCH, CHARLES L., et al., "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress: Volume 1", US EPA Office of Air Quality Planning and Standards, (February 1998), 502 pgs	
	GHORISHI, BEHROOZ S., et al., "In-Flight Capture of Elemental Mercury by Chlorine-Impregnated Activated Carbon", Proc. of the 94th Annual Meeting of the Air and Waste Management Association, Orlando, FL, (June 2001), 14 pgs	
	JONES, ANDREW P., et al., "DOE/NETL's Phase II Mercury Control Technology Field Testing Program: Preliminary Economic Analysis of Activated Carbon Injection", Environmental Science and Technology, 41(4), (2007), 7 pgs	
	KEATING, MARTHA H., et al., "Mercury Study Report to Congress Volume 1: Executive Summary", US EPA Office of Air Quality Planning and Standards, (December 1997), 95 pgs	
	KILGROE, JAMES D., et al., "Control of Mercury Emissions from Coal-Fired Electric Utility Boilers: Interim Report", US EPA Office of Research and Development, National Risk Management Laboratory, Air Pollution Prevention and Control Division, (December 2001), 485 pgs	
	NELSON, SID JR., et al., "How China Can Leapfrog the World in Mercury Emission Reductions", Proc. of the AWMA Intl. Specialty Conference on Leapfrogging Opportunities for Air Quality Improvement, (2010), 24 pgs	
	PAVLISH, JOHN H., et al., "Status review of mercury control options for coal-fired power plants", Fuel Processing Technology, Vol. 82, (2003), 77 pgs	
	YANG, YANG, et al., "Effect of HBr formation on mercury oxidation via CaBr(2) addition to coal during combustion", RSC Advances, 6(64), (2016), 7 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 09/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-20190009247A1	1/10/2019	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15/382,114, Non Final Office Action mailed 12-12-18", 46 pgs		
	"Application Serial No. 15/589,359, Amendment and Response filed 01-17-19 to Non Final Office Action mailed 10-22-18", 14 pgs		
	"Application Serial No. 15/974,343, Amendment and Response filed 12-03-18 to Non Final Office Action mailed 10-29-18", 37 pgs		
	"Application Serial No. 15/974,343, Final Office Action mailed 01-14-19", 25 pgs		
	"Application Serial No. 15/978,760, Amendment and Response filed 12-03-18 to Non Final Office Action mailed 10-10-18", 25 pgs		
	"Application Serial No. 15/978,760, Final Office Action mailed 12-26-18", 21 pgs		
	"Application Serial No. 15/997,091, Final Office Action mailed 01-11-19", 20 pgs		
	"Application Serial No. 15/997,091, Response filed 12-03-18 to Non Final Office Action mailed 11-02-18", 40 pgs.		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 09/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

S/N 14/712,558PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Edwin S. Olson et al.	Examiner:	Amber Orlando
Serial No.:	14/712,558	Group Art Unit:	1776
Filed:	May 14, 2015	Docket:	4820.001US7
Customer No.:	21186	Confirmation No.:	1934
Title:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

COMMUNICATION CONCERNING PRIOR OR COPENDING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

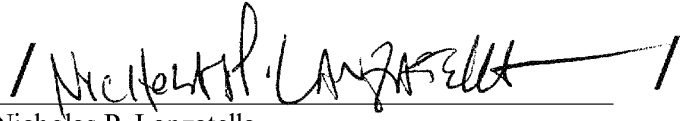
<u>Serial No./</u> <u>Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
16/130,670	September 13, 2018	4820.005US2	SORBENT COMPRISING CARBON AND NITROGEN AND METHODS OF USING THE SAME

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 02/26/2019

By


Nicholas P. Lanzatella
Reg. No. 63,803

/AMBER R ORLANDO/

09/09/2019

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,343,114	7/9/2019	Olson, Edwin S, et al.
	US-20120100053A1	4/26/2012	Durham, Michael D, et al.
	US-20130157845A1	6/20/2013	Nalepa, Christopher J, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	WO-2012030560A1	3/8/2012	Nalepa, Christopher J, et al.

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15/382,114, Final Office Action mailed 06-21-19", 31 pgs		
	"Application Serial No. 15/589,359, Advisory Action mailed 05-22-19", 3 pgs		
	"Application Serial No. 15/589,359, Non Final Office Action mailed 06-21-19", 7 pgs		
	"Application Serial No. 15/978,760, Notice of Allowability mailed 05-30-19", 3 pgs		
	"Application Serial No. 15/978,760, Notice of Allowance mailed 05-08-19", 7 pgs		

EXAMINER

/AMBER R. ORLANDO/

DATE CONSIDERED 09/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50

		sorbent and promoter and activated carbond and mercury				
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:18
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2016/09/29 16:22

		activated carbon	EPO; JPO; DERWENT; IBM_TDB			
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2016/11/16 11:06

			DERWENT; IBM_TDB			
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:28
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2016/11/16 11:32

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54
S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/11/16 15:23
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10,	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39

		B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"				
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787" "3194629" "3662523" "3786619" "3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323"	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20

		"5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.				
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31
S79	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
S80	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358" "6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41
S81	593	honeycomb with plug\$4 and plug\$4 with length	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S82	0	honeycomb with plug\$4 and plug\$4 with length with less than with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S83	0	honeycomb with plug\$4 and plug\$4 with length with less than	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S84	127	honeycomb with plug\$4 and plug\$4 with length with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:46
S85	241	honeycomb with plug\$4 and plug\$4 with length with mm	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:47
S86	41	honeycomb with plug\$4 and plug\$4 with	US-PGPUB;	ADJ	ON	2017/06/27

		length with "3 mm "	USPAT			14:49
S87	28	honeycomb with plug\$4 and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:52
S88	28	honeycomb and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:53
S89	43	honeycomb and plug\$4 with porosity with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:06
S90	20	honeycomb and plug\$4 with pore (size or diameter) with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:07
S91	8	saw with honeycomb with filter	US-PGPUB; USPAT	ADJ	ON	2017/06/29 13:31
S92	230	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/12/01 14:36
S93	2	"20060260468"	US-PGPUB; USPAT	ADJ	ON	2018/07/03 10:34
S94	19	engine with air with inlet with filter\$4 with cone	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:26
S95	36	engine with air with inlet with filter\$4 with (cone or conical or (diameter with (increas\$4 or decreas\$4)))	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:27
S96	24	("3771638" "3870495" "3872012" "4157902" "4702754" "5125940" "5522909" "5549724" "5632793").PN. OR ("5888260").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S97	41	("0153535" "0439091" "1398685" "1530163" "1887052" "2087688" "4003836" "4018580" "4032455" "4039308" "4065276" "4261710" "4410341" "4414110" "4699715" "5106397" "5178656" "5522909" "5549722" "5549724" "5888260" "6397842" "6508052" "D401597" "D401942" "D403414" "D403416").PN. OR ("6808552").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S98	15	("D403416").URPN.	USPAT	ADJ	ON	2018/07/03 15:33
S99	0	"20030089233"	USPAT	ADJ	ON	2018/07/04 12:29
S100	3	"20030089233"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S101	26	"6833023"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S102	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:08
S103	14	carbocations with sorbent with bromine	US-PGPUB; USPAT;	ADJ	ON	2018/07/09 13:14

			USOCR; FPRS; EPO; JPO			
S104	0	a side forming a cross sectional shape of each of the first	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:47
S105	0	non of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S106	0	none of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S107	0	none of sides forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S109	13	olson.in. and (alkali and promoter and earth).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S110	0	olson.in. and (alkali and promoter and earth with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S111	10	olson.in. and (alkali and promoter with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S112	0	"2015008283"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S113	2	"2015008283"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S114	24	olson.in. and liquid.clm. and promoted	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:50
S115	75	remov\$4 with mercury and (br or bromine) with liquid with carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:54
S116	0	separating greater than "70" wt% of the mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S117	0	((separating greater) with (of the mercury)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S118	20	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:43

S119	40	(during with after with mercury with sorbent)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:38
S120	304	sorbent with mercury and sorbent with boiler	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:39
S121	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:41
S122	18	before with burn\$4 with coal with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:42
S123	204	("0174348" "0202092" "0208011" "0224649" "0229159" "0298727" "0346765" "0347078" "0367014" "0537926" "0537998" "0541025" "0625754" "0647622" "0685719" "0688782" "0700888" "0744908" "0846338" "0894110" "0896876" "0911960" "0945331" "0945846" "1112547" "1167471" "1167472" "1183445" "1788466" "1984164" "20020065581" "20020114749" "20020184817" "20030088370" "20030103882" "20040003716" "20040013589" "20040086439" "20040219083" "20050039598" "20060047526" "20060210463" "2016821" "2059388" "2089599" "2511288" "3194629" "3288576" "3437476" "3599610" "3662523" "3725530" "3764496" "3823676" "3838190" "3849267" "3849537" "3956458" "3961020" "3974254" "4040802" "4075282" "4094777" "4101631" "4115518" "4148613" "4174373" "4196173" "4226601" "4233274" "4272250" "4280817" "4305726" "4322218" "4377599" "4387653" "4394354" "4440100" "4472278" "4474896" "4519807" "4519995" "4555392" "4582936" "4602918" "4629721" "4693731" "4716137" "4741278" "4758418" "4764219" "4786483" "4804521" "4807542" "4824441" "4830829" "4873930" "4886519" "4892567" "4915818" "4933158" "4936047" "4964889" "5013358" "5024171" "5049163" "5116793" "5126300" "5137854" "5162598" "5190566" "5238488" "5350728" "5368617" "5409522" "5435980" "5447703" "5460643" "5505746" "5505766" "5571490").PN. OR ("5587003"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/01 17:42

		"5618508" "5635150" "5659100" "5670122" "5733516" "5738834" "5787823" "5810910" "5897688" "5910292" "5989506" "6024931" "6083289" "6240859" "6258334" "6372187" "6375909" "6475451" "6521021" "6528030" "6533842" "6558454" "6610263" "6613110" "6719828" "6732055" "6737031" "6746531" "6790420" "6808692" "6848374" "6878358" "6942840" "6953494" "6962617" "6974564" "6975975" "7468170" "7507083" "7674442" "7758827" "7776301").PN.				
S124	1	"15573128"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:07
S125	2	"20110207597"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:08
S126	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S127	71	sorbent with before with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S128	234	"6953494"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:38
S129	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:40
S130	35	promoter with sorbent and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S131	28	promoter with sorbent with mercury and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S132	4	promoter with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:20
S133	4	promot\$4 with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:23

S134	4	promot\$4 with sorbent with mercury and pre.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:41
S135	2	promot\$4 with sorbent with mercury and pre-heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:42
S136	2	promot\$4 with sorbent with mercury and pre heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S137	57	promot\$4 with sorbent with mercury and pre	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S138	24	sorbent with preheat\$4 with coal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:39
S139	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:47
S140	23	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:28
S141	5	"14102896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:48
S142	7	"12429058"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:09
S143	4	"12202595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:23
S144	20	"12201595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:24
S145	3	"14564860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:27

S146	1	"15978760"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:28
S147	1	"15589359"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:32
S148	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:37
S149	8	"15997091"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S150	6	"14712558"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S151	2	"15951970"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:18
S152	4	"15382114"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:47
S153	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:51
S154	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:18
S155	69	"4279873"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:42
S156	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 07:59
S157	4	"15295594"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 08:08

S158	1	("20180257030").PN.	US-PGPUB; USPAT	ADJ	ON	2018/10/04 09:31
S159	86	"5569436"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:32
S160	6	"5785935"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S161	8	"6475471"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S162	53	"6103205"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:46
S163	0	pyrolysis with char with mercury with activated	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S164	17	pyrolysis with char with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S165	121	pyrolysis with char with activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S166	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S167	43	pyrolysis with char with activated carbon and mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S168	118	pyrolysis with char with tire	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S169	58	pyrolysis with char with activated carbon and mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S170	8	"20040081724"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2018/10/04 15:07

			FPRS; EPO; JPO			
S171	4	"14128179"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 15:10
S172	84	activat\$4 carbon with boiler with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S173	88	activat\$4 carbon with boiler with coal and (remov\$4 or filter\$4 or absorb\$4 or adsorb\$4) with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S174	0	mercury with stabiliz\$4 with sulfur dioxide	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 14:23
S175	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 15:07
S176	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:48
S177	17	"8821819"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:51
S178	15	"8652235"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:55
S179	93	"6136749"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/24 09:08
S180	4	"9757689"	US-PGPUB; USPAT	ADJ	ON	2018/10/24 12:37
S181	9	"8939388"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 09:59
S182	669	urea with inject\$4 with filter\$4 with exhaust	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:15

S183	2	urea with inject\$4 with filter\$4 with exhaust and urea with quench\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:16
S184	13	"3615165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:35
S185	136	urea with quench\$4 with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:39
S186	48	urea dust with scrub\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 11:25
S187	38	"6221155"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 12:04
S188	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 14:12
S189	773	ammonium with remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:14
S190	108	ammonium with salt with remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:15
S191	45	ammonium with salt with remov\$4 with mercury and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:15
S192	42	"5556447"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:21
S193	174	"4500327"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:21
S194	72	"4500327" and ammonium	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:23

S195	3	anionic couterion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S196	3480	anionic counterion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S197	2422	anionic counterion and ammonium with salt	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S198	9	anionic counterion and ammonium with salt and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S199	52	"6960329"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:50
S200	4	"20040003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/06 11:23
S201	1	"45219176".FMID.	US-PGPUB; USPAT; FPRS	ADJ	ON	2018/12/06 13:32
S202	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/01/07 09:41
S203	284	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/04/15 14:29
S204	88	activat\$4 carbon with boiler with coal and (remov\$4 or filter\$4 or absorb\$4 or adsorb\$4) with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/04/15 14:29
S205	42	"6132790"	US-PGPUB; USPAT	ADJ	ON	2019/06/12 16:06
S206	19	remov\$4 with mercury and calcium nitrate with sorbent	US-PGPUB; USPAT	ADJ	ON	2019/06/12 16:55
S207	1	remov\$4 with mercury with calcium nitrate	US-PGPUB; USPAT	ADJ	ON	2019/06/12 16:57
S208	1	"20040146613"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2019/06/13 12:59

			FPRS; EPO; JPO			
S209	71	("6372187").URPN.	USPAT	ADJ	ON	2019/06/18 10:24
S210	48	("6372187").URPN. and (iodide or HI)	USPAT	ADJ	ON	2019/06/18 10:25
S211	61	(iodide or HI) with inject\$4 and mercury with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/18 10:30
S212	85	(iodide or HI) with coal and mercury with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/18 10:35
S213	131	"6558454"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/18 10:41
S214	5	"15295594"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 12:48
S215	82	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 16:29
S216	65	"4013516"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 21:01
S217	24	"4699896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 21:01
S218	2	"20120100053"	US-PGPUB; USPAT	ADJ	ON	2019/08/17 11:40
S219	1	"20130157845"	US-PGPUB; USPAT	ADJ	ON	2019/08/17 11:40
S220	204	coal with combust\$4 and sorbent with (iodine or iodide or HI)	US-PGPUB; USPAT	ADJ	ON	2019/09/04 12:15
S221	184	coal with combust\$4 and sorbent with (iodine or HI)	US-PGPUB; USPAT	ADJ	ON	2019/09/04 12:18
S222	184	coal with combust\$4 and sorbent with (iodine or HI) and (iodine or HI)	US-PGPUB; USPAT	ADJ	ON	2019/09/04 12:20
S223	0	electric utility coal combustion chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:06
S224	12	electric with coal combustion chamber	US-PGPUB; USPAT;	ADJ	ON	2019/09/04 14:07

			USOCR; FPRS; EPO; JPO			
S225	1755	electric with coal with combustion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:08
S226	219	electric with coal with combustion with chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:09
S227	89	electric with coal with combustion with chamber	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/09/04 14:09
S228	20	subbituminous with coal with chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 19:42
S229	191	subbituminous with coal with combustion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 19:43
S230	1009	lignite with coal with combustion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 20:09
S231	0	lignite with coal with combustion and mercury with sorbet	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 20:10
S232	54	lignite with coal with combustion and mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 20:10
S233	4	"14917980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/05 12:48
S234	246	"6878358"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/05 13:31

9/ 9/ 2019 12:26:38 PM

C:\Users\amillerharris\Documents\EAST\Workspaces\12429058.wsp

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/712,558	Filing Date 05/14/2015	☐ 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), (l), 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 \$80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x \$420 =	
☐ 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)	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	09/17/2019		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	24	Minus	** 29	= 0
	Independent (37 CFR 1.16(h))	*	5	Minus	*** 5	= 0
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						0
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	-	Minus	**	=
	Independent (37 CFR 1.16(h))	*	-	Minus	***	=
	☐ 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".						/ROLITA M WIMBUSH/
*** 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.

A/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Application No. 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.111

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

Applicant has received the Non-Final Office Action dated September 12, 2019. Please enter the following.

IN THE CLAIMS

Please amend the claims as follows:

1.-65. (Canceled)

66. (Previously Presented) A method for treating a mercury-containing gas, the method comprising:

combusting a mixture comprising coal, pyrolysis char, and an additive comprising HBr, a bromide compound, or a combination thereof, to form the mercury-containing gas; and

adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

67. (Previously Presented) The method of claim 66, wherein the pyrolysis char is a promoted pyrolysis char.

68. (Previously Presented) The method of claim 66, wherein the pyrolysis char and the additive are added prior to a combustor that combusts the mixture, within the combustor, or a combination thereof.

69. (Previously Presented) The method of claim 66, wherein the pyrolysis char and the additive are added within a combustor that combusts the mixture.

70. (Previously Presented) The method of claim 66, further comprising using a particle separation device to remove mercury from the flue gas and comprising collecting greater than 70 wt% of the mercury in the mercury-containing gas to produce a cleaned gas.

71. (Previously Presented) The method of claim 70, further comprising:
measuring the mercury content of the mercury-containing gas; and
modifying, in response to the measured mercury content:
an injection rate of injecting the sorbent into the mercury-containing gas,
an amount of the additive in the mixture, or
a combination thereof.
72. (Previously Presented) The method of claim 66, wherein the additive further comprises Br₂.
73. (Previously Presented) The method of claim 66, wherein the sorbent material is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof.
74. (Previously Presented) The method of claim 66, further comprising adding an alkaline component to the mercury-containing gas, the alkaline component chosen from alkali elements, alkaline earth elements, alkali salts, alkaline earth salts, and combinations thereof.
75. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a mercury-stabilizing reagent chosen from S, Se, H₂S, SO₂, H₂Se, SeO₂, CS₂, P₂S₅, and combinations thereof.
76. (Previously Presented) The method of claim 66, further comprising contacting the sorbent material with a secondary component chosen from halogens, hydrogen halides, Group V halides, Group VI halides, and combinations thereof.
77. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from halogens, halide salts, HI, HBr, HCl, and combinations thereof.

78. (Previously Presented) The method of claim 76, wherein the secondary component is chosen from I₂, HI, and combinations thereof.

79. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor comprising pyrolysis char and an additive comprising HBr, a bromide compound, or a combination thereof, to form the mercury-containing gas; and
adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

80. (Previously Presented) The method of claim 79, wherein the pyrolysis char is a promoted pyrolysis char.

81. (Previously Presented) A method for treating a mercury-containing gas, the method comprising:

combusting coal in a combustor and adding within the combustor a pyrolysis char promoted by an additive comprising HBr, a bromide compound, or a combination thereof, to form the mercury-containing gas; and
adding a particulate sorbent material comprising activated carbon into the mercury-containing gas.

82. (Currently Amended) A method for treating a mercury-containing gas, the method comprising:
- combusting a mixture comprising coal, pyrolysis char, and an additive comprising HBr, a bromide compound, or a combination thereof, to form the mercury-containing gas; and
 - adding a sorbent material comprising activated carbon into the mercury-containing gas.
83. (Previously Presented) The method of claim 66, further comprising
- modifying, in response to a measured mercury content,
 - an injection rate of injecting the sorbent into the mercury-containing gas,
 - an amount of the additive in the mixture, or
 - a combination thereof.
84. (Previously Presented) The method of claim 66, wherein the coal comprises added sorbent enhancement additive that comprises the bromide compound.
85. (Previously Presented) The method of claim 66, wherein the coal is combusted in a combustion chamber at a coal-combustion facility, wherein the HBr, bromide compound, or combination thereof, is added to the coal before the coal enters the combustion chamber, wherein the addition of the HBr, bromide compound, or combination thereof, to the coal is performed at the coal-combustion facility.
86. (Previously Presented) The method of claim 66, wherein the coal is combusted in a combustion chamber at a coal-combustion facility, wherein the HBr, bromide compound, or combination thereof, is added to the coal before the coal enters the combustion chamber, wherein the addition of the HBr, bromide compound, or combination thereof, to the coal is performed at a site other than the coal-combustion facility.
87. (Previously Presented) The method of claim 66, wherein the sorbent is contacted with a halogen or halide promoter prior to the addition of the sorbent to the mercury-containing gas.

88. (Previously Presented) The method of claim 66, wherein the sorbent is free of contact with a halogen or halide promoter prior to the addition of the sorbent to the mercury-containing gas.

89. (Previously Presented) The method of claim 71, wherein the measurement of the mercury content of the mercury-containing gas comprises continuous measurement.

90. (Previously Presented) The method of claim 66, wherein the coal comprises subbituminous coal.

91. (Previously Presented) The method of claim 66, wherein the coal comprises lignite coal.

92. (Previously Presented) The method of claim 66, wherein the mixture is combusted in a combustion chamber of a coal-combustion facility upstream of a scrubber, a particulate control system, or a combination thereof, wherein the particulate sorbent is added to the mercury-containing gas before the mercury-containing gas encounters the scrubber, the particulate control system, or the combination thereof.

93. (Previously Presented) The method of claim 91, wherein the particulate control system comprises an electrostatic precipitator, a baghouse, a fabric filter, or a combination thereof.

94. (Previously Presented) The method of claim 84, wherein the combustion chamber is a coal combustion furnace.

REMARKS

This responds to the Non-Final Office Action dated September 12, 2019.

Claims 79 and 82 are presently amended. No claims are presently canceled, and claims 1-65 were canceled previously. No new claims are presently added. As a result, claims 66-94 are now pending in this application.

Claim 79 is presently amended to recite "...and..."

Claim 82 is amended to add a semicolon.

No new matter is added via the amendments herein.

Double Patenting Rejections

I(A). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-30 of U.S. patent no. 7,435,286 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-30 of U.S. patent no. 7,435,286 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(B). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-25 of U.S. patent no. 8,168,147 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-25 of U.S. patent no. 8,168,147 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(C). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-60 of U.S. patent no. 8,512,655 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-60 of U.S. patent no. 8,512,655 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(D). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. patent no. 8,821,819 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-60 of U.S. patent no. 8,821,819 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(E). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-33 of U.S. patent no. 9,757,689 in view of U.S. patent no. 5,435,980 ("Felsvang").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-33 of U.S. patent no. 9,757,689 in view of Felsvang. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(F). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-20 of U.S. patent no. 9,468,886 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-20 of U.S. patent no. 9,468,886 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(G). The Office Action rejected claims 66-94 on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. patent no. 8,652,235 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-30 of U.S. patent no. 8,652,235 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(H). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-16 of copending application no. 15/295,594 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-16 of copending application no. 15/295,594 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(D). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting over claims 8-20 of copending application no. 15/589,359 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 8-20 of copending application no. 15/589,359 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(J). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/853,029 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-20 of copending application no. 15/853,029 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(K). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/978,760 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-20 of copending application no. 15/978,760 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(L). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending application no. 15/951,970 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-20 of copending application no. 15/951,970 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(M). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/382,114 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-20 of copending application no. 15/382,114 in view of Felsvang, Wojtowicz and Sing. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

I(N). The Office Action provisionally rejected claims 66-94 on the ground of nonstatutory double patenting over claims 1-20 of copending Application No. 15/853,029 in view of U.S. patent no. 5,435,980 ("Felsvang"), U.S. 6,103,205 ("Wojtowicz"), and U.S. patent no. 4,699,896 ("Sing").

This rejection is respectfully traversed. Applicant does not admit that claims 66-94 are obvious over claims 1-20 of copending Application No. 15/853,029 in view of Felsvang, Wojtowicz and Sing. This rejection appears to be a duplicate of the rejection listed herein at **I(J)**. However, merely to expedite prosecution, a Terminal Disclaimer in compliance with 37 C.F.R. § 1.321 is enclosed herewith to obviate these rejections.

Applicant therefore respectfully requests reconsideration and withdrawal of the double patenting rejection.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

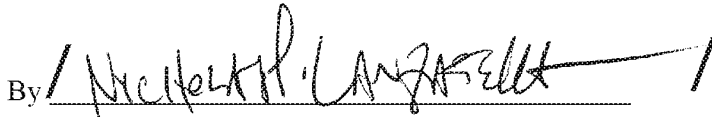
P.O. Box 2938

Minneapolis, MN 55402-0938

(612) 373-6900

Date September 17, 2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

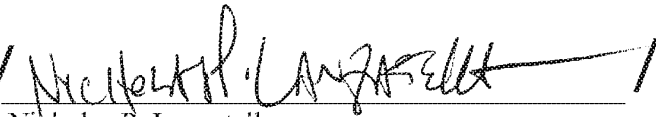
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date September 17, 2019

By



Nicholas P. Lanzatella
Reg. No. 63,803

NPL:mlr1

**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING
REJECTION OVER A PENDING "REFERENCE" APPLICATION**

Docket Number

4820.001US7

In re Application of: EDWIN S. OLSON ET AL.

Application No.: 14/712,558

Filed: May 14, 2015

For: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

The applicant, **Midwest Energy Emissions Corp**, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s) 15/382,114; 15/589,359; 15/295,594; 15/853,029; 15/951,970; 15/978,760, filed, 12/16/16; 05/08/17; 10/17/16; 12/22/17; 04/12/18; 05/14/18, as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

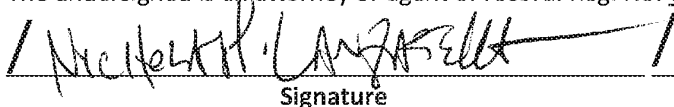
In making the above disclaimer, the applicant does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that: any such patent granted on the pending reference application expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

Check either box 1 or 2 below, if appropriate:

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 63,803


Signature

September 17, 2019

Date

Nicholas P. Lanzatella

Typed or printed name

Attorney/Agent of Record

Title

(612) 349-9580

Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-5,556,447	9/17/1996	Srinivasachar, Srivats, et al.
	US-7,361,209	4/22/2008	Durham, Michael D, et al.
	US-20020114749A1	8/22/2002	Cole, Jerald Alan
	US-20030113239A1	6/19/2003	Pahlman, John E, et al.
	US-20030161771A1	8/28/2003	Oehr, Klaus H
	US-20040244657A1	12/9/2004	Srinivasachar, Srivats, et al.
	US-20070259781A1	11/8/2007	Sinha, Rabindra K
	US-20140099244A1	4/10/2014	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15/295,594, Final Office Action mailed 08-02-19", 18 pgs		
	"Application Serial No. 15/589,359, Notice of Allowance mailed 07-31-19", 7 pgs		
	"Application Serial No. 15/589,359, Response filed 07-16-19 to Non Final Office Action mailed 06-21-19", 7 pgs.		
	"Application Serial No. 15/974,343, Non Final Office Action mailed 08-21-19", 13 pgs		
	"Application Serial No. 15/974,343, Response Filed 07-10-2019 to Final Office Action mailed 01-14-19", 81 pgs		
	"Application Serial No. 15/997,091, Non Final Office Action mailed 08-23-19", 14 pgs		
	"Application Serial No. 15/997,091, Response filed 07-10-19 to Final Office Action mailed 01-11-19", 80 pgs.		
	"Application Serial No. 16/509,071, Non Final Office Action mailed 09-11-19", 21 pgs.		

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number

4820.001US7

In re Application of: Edwin S. Olson et al.

Application No.: 14/712,558

Filed: May 14, 2015

For: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

The applicant, Midwest Energy Emissions Corp, owner of the entire interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent No.(s) 7,435,286; 8,168,147; 8,512,655; 8,821,819; 9,757,689; 8,652,235; 9,468,886** as the term of said **prior patent(s)** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent(s)** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent(s)**, "as the term of said **prior patent(s)** is presently shortened by any terminal disclaimer," in the event that said **prior patent(s)** later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 63,803
- Nicholas P. Lanzatella September 17, 2019
Nicholas P. Lanzatella Date
- Attorney/Agent of Record (612) 349-9580
Title Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Stephen Michael Komarec/Megan Reed		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
Total in USD (\$)				400

Electronic Acknowledgement Receipt	
EFS ID:	37192586
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Stephen Michael Komarec/Megan Reed
Filer Authorized By:	Stephen Michael Komarec
Attorney Docket Number:	4820.001US7
Receipt Date:	17-SEP-2019
Filing Date:	14-MAY-2015
Time Stamp:	17:42:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 400
RAM confirmation Number	E20199GH43104962
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		SIGNED_4820_001US7_NFOAR espSIDS_TD.pdf	335254	yes	18
			f6da9c3bb807ede03c669e6dab71a5a2a06f527a		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	1	
	Amendment/Req. Reconsideration-After Non-Final Reject		2	2	
	Claims		3	7	
	Applicant Arguments/Remarks Made in an Amendment		8	13	
	Transmittal Letter		14	15	
	Information Disclosure Statement (IDS) Form (SB08)		16	16	
	Terminal Disclaimer Filed		17	17	
	Terminal Disclaimer Filed		18	18	
Warnings:					
Information:					
2	Non Patent Literature	0001_2_npl_4820001u10_aarf_071019_f.pdf	5042905	no	80
			0f333f741418d0f5d80406e6a2eef924edd750a		
Warnings:					
Information:					
3	Non Patent Literature	0002_2_npl_4820001u10_oarn_08232019_f.pdf	566147	no	14
			cc5e5bed27d0f82d38544b9262c2fd0ee56e8d66		
Warnings:					
Information:					

4	Non Patent Literature	0003_2_npl_4820001u11_oarn pe_20190911_f.pdf	919625	no	21
			b790266a3cf625111869631deb8ad0aa5936fc0		
Warnings:					
Information:					
5	Non Patent Literature	0004_2_npl_4820001us8_2019 0710_rsp_f.pdf	7325368	no	81
			d2074a242fcfac407687ac90209ff1f1089861e7d2		
Warnings:					
Information:					
6	Non Patent Literature	0005_2_npl_4820001us9_oarn pe_08212019_f.pdf	468709	no	13
			392d7bcd3c72aeb9f363ada648ae2f46fb a0a5		
Warnings:					
Information:					
7	Non Patent Literature	0006_2_npl_4820003us2_aarn _071619_f.pdf	117408	no	7
			03be8c0c15e6148e58893a95ca77fd203ac9c3a4		
Warnings:					
Information:					
8	Non Patent Literature	0007_2_npl_4820003us2_noar _07312019_f.pdf	513833	no	7
			7b752ee358554077a001ecc4a64bb3c76de ad7f1		
Warnings:					
Information:					
9	Non Patent Literature	0008_2_npl_4820007us3_foar _08022019_f.pdf	772710	no	18
			35ae2fb60c98fb17d02d5eebaac8797be2c b2c64		
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	31866	no	2
			a0ce482f6f47bffa140332e8cad58eb78845 d101		
Warnings:					
Information:					
Total Files Size (in bytes):			16093825		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: December 12, 2019

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

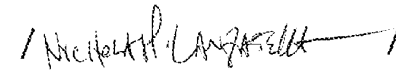
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Amendment and Response under 37 C.F.R. § 1.111 (12 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (8).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).
- ☒ Terminal Disclaimer over Pending Applications (1 pg.)
- ☒ Terminal Disclaimer over Prior Patents (1 pg.)
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$160.00 to cover the fee for the Terminal Disclaimers

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By: 

Nicholas P. Lanzatella

Reg. No. 63,803



United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :83605

Sale Accounting Date:09/19/2019

Sale Item Reference Number
14712558

Effective Date
09/19/2019

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20199I200083158	1814	STATUTORY OR TERMINAL DISCLAIMER	\$160.00	Deposit Account

Application Number * 14/712,558 *	Application/Control No. 14/712,558	Applicant(s)/Patent under Reexamination Olson et al.	
	Examiner ORLANDO, AMBER ROSE	Art Unit 1776	
Document Code - DISQ		Internal Document - DO NOT MAIL	

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed: <u>17 September 2019</u>	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
2/Tds both approved. /LAWANA R HIXON/ Technology Center: OPLC Telephone: (571)272-6074

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 2		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,471,412	11/12/2019	Olson, Edwin S, et al.
	US-20050274307A1	12/15/2005	Lissianski, Vitali Victor, et al.
	US-20190329179A1	10/31/2019	Olson, Edwin S., et al.
	US-20190329215A1	10/31/2019	Olson, Edwin S, et al.
	US-20190336913A1	11/7/2019	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15/382,114, Response filed 10-3-19 to Final Office Action mailed 06-21-19", 23 pgs.		
	"Application Serial No. 15/589,359, Corrected Notice of Allowability mailed 10-11-19", 2 pgs.		
	"Application Serial No. 15/974,343, Corrected Notice of Allowability mailed 10-23-19", 2 pgs.		
	"Application Serial No. 15/974,343, Notice of Allowance mailed 09-17-19", 7 pgs.		
	"Application Serial No. 15/997,091, Corrected Notice of Allowability mailed 10-23-19", 3 pgs.		
	"Application Serial No. 15/997,091, Notice of Allowance mailed 09-18-19", 8 pgs.		
	"Application Serial No. 16/509,071, Response filed 10-3-2019 to Non Final Office Action mailed 09-11-19", 26 pgs.		
	"Application Serial No. 16/509,102, Amendment and Response filed 11-11-19 to Non Final Office Action mailed 10-23-19", 34 pgs.		
	"Application Serial No. 16/509,102, Non Final Office Action mailed 10-23-19", 26 pgs.		
	"Application Serial No. 16/509,146, Amendment and Response filed 11-11-19 to Non Final Office Action mailed 10-17-19", 34 pgs.		
	"Application Serial No. 16/509,146, Non Final Office Action mailed 10-17-19", 24 pgs.		
	"Ch. 35: Mercury, Hazardous Air Pollutants and other Multi-Pollutant Control", Tomei, G. L. (Ed.). Steam: its generation and use, Babcock and Wilcox Co., (2015), 24 pgs.		
	"Defendant's Answer and Counterclaim", Midwest Energy Emissions Corp., et al., v. Vistra Energy Corp., et al. - Case 1:19-cv-01334-RGA, (10-09-19), 71 pgs.		

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 2	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Original Complaint for Patent Infringement", Midwest Energy Emissions Corp., et al., v. Vistra Energy Corp., et al. - Case 1:19-cv-01334-UNA, (07-17-19), 31 pgs.	
	"Plaintiff's Answer to Defendant's Counterclaims", Midwest Energy Emissions Corp., et al., v. Vistra Energy Corp., et al. - Case 1:19-cv-01334-RGA, (10-30-19), 37 pgs.	
	OLSON, E.S., et al., "Chemical mechanisms in mercury emission control technologies", J. Phys. IV France 107, Proc. of the XIth Intl. Conference on Heavy Metals in the Environment Volume II, pp. 979-982, (2003), 6 pgs.	
	OLSON, EDWIN S., "Abstract - Multiple Site Model for Flue Gas - Mercury interactions on Activated Carbons: The Basic Site", Abstracts of Papers Part 1, 225th ACS National Meeting, New Orleans, LA, (2003), 3 pgs.	
	OLSON, EDWIN S., et al., "An Improved Model for Flue Gas - Mercury Interactions on Activated Carbons", Proceedings of the Combined Power Plant Air Pollutant Control Mega Symposium, (May 2003), 8 pgs.	
	OLSON, EDWIN, et al., "The Multiple Site Model for Flue Gas - Mercury Interactions on Activated Carbons: The Basic Site", Fuel Chemistry Preprints, 48(1), (2003), 3 pgs.	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Garrett M. Hall/Jamie Johnson		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt

EFS ID:	37768420
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Garrett M. Hall/Jamie Johnson
Filer Authorized By:	Garrett M. Hall
Attorney Docket Number:	4820.001US7
Receipt Date:	15-NOV-2019
Filing Date:	14-MAY-2015
Time Stamp:	16:09:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 240
RAM confirmation Number	E2019AEG09334319
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		14712558_SIDS_11-15-2019.pdf	231723	yes	7
			53bd81ce0adf189015780d458be1e44cdb6ac92f		
	Multipart Description/PDF files in .zip description				
	Document Description		Start		End
	Miscellaneous Incoming Letter		1		1
	Miscellaneous Incoming Letter		2		3
	Transmittal Letter		4		5
	Information Disclosure Statement (IDS) Form (SB08)		6		7
Warnings:					
Information:					
2	Non Patent Literature	0001_2_npl_4820007us5_aarn_111119_f.pdf	364377	no	34
			8b63e5071c12b1b55a484c90f63040b261171504		
Warnings:					
Information:					
3	Non Patent Literature	0002_2_npl_4820001u10_cnoa_10232019_f.pdf	106645	no	3
			9fc3d79b488a0f46a72a0b178e3ebcd055329229		
Warnings:					
Information:					
4	Non Patent Literature	0003_2_npl_4820001u10_noar_09182019_f.pdf	498514	no	8
			22a91fd17430136fef714b9d45f5a3b28fee44d5		
Warnings:					
Information:					

5	Non Patent Literature	0004_2_npl_4820001u11_nonfinalofficeactionresponseprioritized_f.pdf	526929	no	26
			968f272d79ade437243b22a3a25bec7988f1cc6		
Warnings:					
Information:					
6	Non Patent Literature	0005_2_npl_4820001u12_aarn_111119_f.pdf	1565094	no	34
			eb23f1e6b7edb470cc74369c029ec66dd79244d		
Warnings:					
Information:					
7	Non Patent Literature	0006_2_npl_4820001u12_oarnpe_10232019_f.pdf	1143427	no	26
			4b85e536f046f94195d4afe8b2ad0972fc3f5aac		
Warnings:					
Information:					
8	Non Patent Literature	0007_2_npl_4820001us9_cnoa_10232019_f.pdf	101253	no	2
			5e9bcd715ee09126df480106b4055bfead2f5eb3		
Warnings:					
Information:					
9	Non Patent Literature	0008_2_npl_4820001us9_noar_09172019_f.pdf	491523	no	7
			d2173b9470b9799cbcefe56002478c0b4a349adc6		
Warnings:					
Information:					
10	Non Patent Literature	0009_2_npl_4820003us2_cnoa_10112019_f.pdf	101037	no	2
			2ed3d2d7a94ab9b82b0aa9059e8be4a46c62a0f2		
Warnings:					
Information:					
11	Non Patent Literature	0010_2_npl_4820004us1_amentresponsefinalofficeaction_f.pdf	484739	no	23
			6c9088ef897d34045ea3fffaa8cd851fdddd22f4		
Warnings:					
Information:					

12	Non Patent Literature	0011_2_npl_4820007us5_oarn_10172019_f.pdf	1057697	no	24
			11d8ef27fe2652af44711d667e7b683452becb38a		
Warnings:					
Information:					
13	Non Patent Literature	0012_2_npl_me2c_aep_answer_counterclaim_10092019_f.pdf	472359	no	71
			2b5133a108c594131604037b758a853c5220836a		
Warnings:					
Information:					
14	Non Patent Literature	0013_2_npl_me2c_aep_plaintiff_answer_10302019_f.pdf	359806	no	37
			023db7073ee888102a25bfe9b1b6bc058cc0bfc		
Warnings:					
Information:					
15	Non Patent Literature	0014_2_npl_me2c_vistra_complaint_07172019_f.pdf	233926	no	31
			3821bf295514de2d53aa079d30411972dd44bc7a		
Warnings:					
Information:					
16	Non Patent Literature	0015_2_npl_olson_chemicalmechanisms_2003_f.pdf	3555311	no	6
			ae6f386f0ac68c76c2e578f0ea65cd1199716100		
Warnings:					
Information:					
17	Non Patent Literature	0016_2_npl_olson_improvedmodel_2003_f.pdf	710676	no	8
			18e0eaf32fddb903dfbf82fcb41c2721defde48e		
Warnings:					
Information:					
18	Non Patent Literature	0017_2_npl_olson_multiplesites_2003_f.pdf	503809	no	3
			ffe6b838757e16d95ba3b8b25e238c1c9d5c00b8a		
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					

19	Non Patent Literature	0018_2_npl_olson_multiplesite_abstract_2003_f.pdf	1478989 f07442a903ecfe9541f897e24048dc01af60ae75	no	3
Warnings:					
Information:					
20	Non Patent Literature	0019_2_npl_steam_42_ch_35_2015_f.pdf	4031937 01dd8b86b962125b2b410864f658bcd94e18be30	no	24
Warnings:					
Information:					
21	Fee Worksheet (SB06)	fee-info.pdf	30378 fc86ea7e3d1019010ccb6d1a50667914e82fc4d2	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			18050149		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Serial No.: 14/712,558

Filed: May 14, 2015

Due Date: N/A

Examiner: Amber Orlando

Group Art Unit: 1776

Customer No.: 21186

Confirmation No.: 1934

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

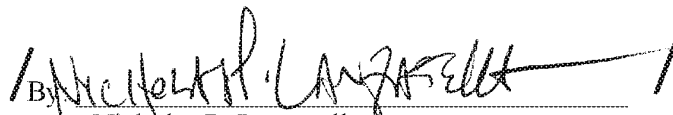
We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Communication Concerning Prior and Copending Applications (2 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (2 pgs.) Copies of Cited References (19).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

Customer No.: 21186

By 
Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COPENING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
16/509,071	July 11, 2019	4820.001U11	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
16/509,102	July 11, 2019	4820.001U12	TREATMENT OF COAL WITH MERCURY CONTROL ADDITIVES
16/574,935	September 18, 2019	4820.003US3	ACTIVATED CARBON SORBENT INCLUDING NITROGEN AND METHODS OF USING THE SAME
16/509,146	July 11, 2019	4820.007US5	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR PENDING APPLICATIONS

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

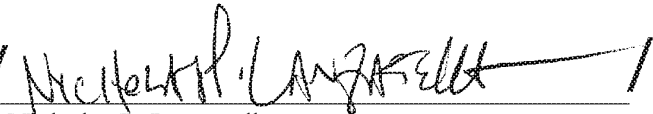
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date 11/15/2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

MS Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

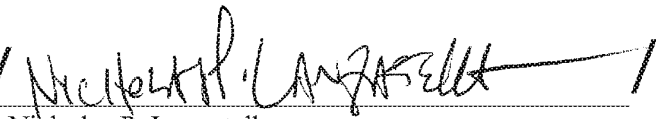
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date 11/15/2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:jj



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

21186 7590 12/13/2019
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER

ORLANDO, AMBER ROSE

ART UNIT

PAPER NUMBER

1776

DATE MAILED: 12/13/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934

TITLE OF INVENTION: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	03/13/2020

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

By fax, send to: (571)-273-2885

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

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

21186 7590 12/13/2019
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

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.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934

TITLE OF INVENTION: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	03/13/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
ORLANDO, AMBER ROSE	1776	095-142000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (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. 2 _____
- 3 _____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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

- ☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

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

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

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

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	12/13/2019	EXAMINER	
SCHWEGMAN LUNDBERG & WOESSNER, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402			ORLANDO, AMBER ROSE	
			ART UNIT	PAPER NUMBER
			1776	
DATE MAILED: 12/13/2019				

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. 14/712,558	Applicant(s) Olson et al.	
	Examiner AMBER R ORLANDO	Art Unit 1776	AIA (FITF) Status No

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

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

1. ☒ This communication is responsive to the terminal disclaimers filed 09/17/2019.
☐ 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 66-94. 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)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Terminal Disclaimer

The terminal disclaimer filed on 09/17/2019 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of **applications 15/382,114, 15/589,359, 15/295,594, 15/853,029, 15/951970, 15/978, 760, and patents 7,435,286, 8,168,147, 8,512,655, 8,821,819, 9,757,689, 8,652,235 and 9,468,886** has been reviewed and is accepted. The terminal disclaimer has been recorded.

Allowable Subject Matter

Claims 66-94 are allowed.

The following is an examiner's statement of reasons for allowance: the reasons for allowance are the same as that of US 10,343,114, detailed in the action dated 04/19/2019.

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

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

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, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

Issue Classification 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC						
Symbol					Type	Version
B01D	/	53	/	64	F	2013-01-01
B01D	/	53	/	10	I	2013-01-01
B01J	/	20	/	20	I	2013-01-01
B01J	/	20	/	02	I	2013-01-01
B01J	/	20	/	0262	I	2013-01-01
B01J	/	20	/	027	I	2013-01-01
B01J	/	20	/	04	I	2013-01-01
B01J	/	20	/	041	I	2013-01-01
B01J	/	20	/	043	I	2013-01-01
B01J	/	20	/	10	I	2013-01-01
B01J	/	20	/	106	I	2013-01-01
B01J	/	20	/	12	I	2013-01-01
B01J	/	20	/	223	I	2013-01-01
B01J	/	20	/	28004	I	2013-01-01
B01J	/	20	/	28016	I	2013-01-01
B01J	/	20	/	3416	I	2013-01-01
B01J	/	20	/	22	I	2013-01-01
B01D	/	2253	/	102	A	2013-01-01
B01D	/	2257	/	602	A	2013-01-01
Y10S	/	95	/	901	A	2013-01-01
B01J	/	2220	/	42	A	2013-01-01

CPC Combination Sets							
Symbol				Type	Set	Ranking	Version
	/		/				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	29	
/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	09 December 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	66	NA

Issue Classification 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

INTERNATIONAL CLASSIFICATION				
CLAIMED				
B01D	/	53	/	64
B01D	/	53	/	10
B01J	/	20	/	20
B01J	/	20	/	02
B01J	/	20	/	04
B01J	/	20	/	10
B01J	/	20	/	12
B01J	/	20	/	22
B01J	/	20	/	28
B01J	/	20	/	34
NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	29	
/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	09 December 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	66	NA

Issue Classification 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

☒ 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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	29	
/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	09 December 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	66	NA

<i>Search Notes</i> 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	6/27/2017	AO
B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10	06/27/2017	AO

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.

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

Search Notes 	Application/Control No. 14/712,558	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

Search Notes		
Search Notes	Date	Examiner
CPC classes searched for promoted sorbents for mercury removal (EAST).	6/27/2017	AO
IDS Search (EAST and DAV)	6/27/2017	AO
Inventor Search (DAV)	6/27/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	12/01/2017	AO
Inventor Search (DAV)	12/01/2017	AO
CPC classes searched for promoted sorbents for mercury removal (EAST).	06/25/2018	AO
Text Search in EAST for sorbents added throughout the system and pyrolysis char (EAST).	10/16/2018	AO
IDS Search (EAST and DAV)	01/07/2019	AO
EAST Text Search	01/07/2019	AO

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	SEE EAST SEARCH HISTORY	09/09/2019	AO

/AMBER R ORLANDO/ Primary Examiner.Art Unit 1776	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	"20050274307"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 08:26
L2	11	"9221013"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:06
L3	36	"5556447"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:15
L4	42	"7361209"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:23
L5	16	"20020114749"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:23
L6	1	"20030113239"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:25
L7	1	"20040244657"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:26
L8	1	"20070259781"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 09:26
L9	3	"10343114"	US-PGPUB; USPAT	ADJ	ON	2019/12/09 10:11
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25

		"5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.				
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2016/09/29 15:01

			DERWENT; IBM_TDB			
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:18
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:22
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2016/11/16 11:04

			IBM_TDB			
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2016/11/16 11:09

			EPO; JPO; DERWENT; IBM_TDB			
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:28
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S50	11	"20040025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:32
S51	15	"2004025274"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S52	40	"6312489"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:33
S53	30	("20030024872" "20050045553" "20050144916" "4008060" "4640779" "4655921" "4673503" "4738778" "4746432" "4799944" "5043000" "5051118" "5120296" "5174896" "5320657" "5512075" "5674302" "6152979" "6312489" "6315130" "6336946" "6398836" "6585793" "6598749" "7648546").PN. OR ("7931723").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:36
S54	33	("4200444" "4640779" "5968215" "6059851").PN. OR ("6312489").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:40
S55	5	"8518142"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:54

S56	4	"8747505"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 11:57
S57	2	"14318270"	US-PGPUB; USPAT; USOCR	ADJ	ON	2016/11/16 12:06
S58	13	pac with size with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 12:13
S59	197	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/11/16 15:23
S60	0	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent "4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S61	10	"4198388"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 12:39
S62	0	"2010083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S63	2	"20100083696"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:32
S64	2	absorp\$5 with mea with methanol with acid	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:36
S65	2	"20070283813"	US-PGPUB; USPAT	ADJ	ON	2016/11/17 13:39
S66	21	"4469596"	US-PGPUB; USPAT	ADJ	ON	2016/11/21 08:29
S67	4	"2003229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S68	2	"20030229245"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:36
S69	45	"5,338,458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2017/05/10 10:38
S70	45	"5338458"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2017/05/10 10:38

			DERWENT; IBM_TDB			
S71	213	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:02
S72	64	("1786483" "1984164" "2317857" "20010002387" "20010003116" "20020134242" "20020150516" "20030136509" "20040003716" "20040013589" "20050019240" "20060048646" "20060191835" "20090062119" "20100047146" "20120183458" "20140056787" "3194629" "3662523" "3786619" "3826618" "3849267" "4196173" "4500327" "4814152" "4820318" "4889698" "4959162" "5300137" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6818043" "6848374" "6878358" "6942840" "6953494" "7101631" "7435286" "7479263" "7514052" "7563311" "7611564" "8007749" "8168147" "8168149" "8512655").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:20
S73	3	("20090235848" "20110076210" "20150246315").PN.	US-PGPUB; USPAT	ADJ	ON	2017/05/10 11:31
S79	3	("20090235848" "20110076210" "20140224121").PN.	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:36
S80	96	("1984164" "2317857" "20010002387" "20010003116" "20020043496" "20020134242" "20020150516" "20030104937" "20030136509" "20040003716" "20040013589" "20040076570" "20050019240" "20060048646" "20060191835" "20080182747" "20080292512" "20090062119" "20090136401" "20090320678" "20100047146" "20110168018" "20120183458" "20130280156" "20140056787" "20140255279" "20140308188" "20150098878" "3194629" "3662523" "3786619" "3826618" "3849267" "3876393" "4094777" "4101631" "4196173" "4338896" "4500327" "4708853" "4786483" "4814152" "4820318" "4889698" "4956162" "5300137" "5336835" "5409522" "5462908" "5505766" "5575982" "5607496" "5672323" "5695726" "5827352" "5891324" "6027551" "6080281" "6136072" "6136749" "6214304" "6258334" "6372187" "6375909" "6383981" "6471936" "6528030" "6638485" "6808692" "6818043" "6848374" "6878358"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 09:41

		"6942840" "6953494" "6960329" "7081434" "7211707" "7435286" "7479263" "7514052" "7521032" "7544338" "7563311" "7611564" "7622092" "7722843" "7767174" "7780765" "8007749" "8168147" "8168149" "8216535" "8512655" "8652235" "8821819" "9011805").PN.				
S81	593	honeycomb with plug\$4 and plug\$4 with length	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S82	0	honeycomb with plug\$4 and plug\$4 with length with less than with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S83	0	honeycomb with plug\$4 and plug\$4 with length with less than	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:45
S84	127	honeycomb with plug\$4 and plug\$4 with length with "5"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:46
S85	241	honeycomb with plug\$4 and plug\$4 with length with mm	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:47
S86	41	honeycomb with plug\$4 and plug\$4 with length with "3 mm "	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:49
S87	28	honeycomb with plug\$4 and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:52
S88	28	honeycomb and plug\$4 with length with "3 mm " and plug\$4 with porosity	US-PGPUB; USPAT	ADJ	ON	2017/06/27 14:53
S89	43	honeycomb and plug\$4 with porosity with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:06
S90	20	honeycomb and plug\$4 with pore (size or diameter) with "100"	US-PGPUB; USPAT	ADJ	ON	2017/06/27 15:07
S91	8	saw with honeycomb with filter	US-PGPUB; USPAT	ADJ	ON	2017/06/29 13:31
S92	230	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2017/12/01 14:36
S93	2	"20060260468"	US-PGPUB; USPAT	ADJ	ON	2018/07/03 10:34
S94	19	engine with air with inlet with filter\$4 with cone	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:26
S95	36	engine with air with inlet with filter\$4 with (cone or conical or (diameter with (increas\$4 or decreas\$4)))	US-PGPUB; USPAT	ADJ	ON	2018/07/03 15:27
S96	24	("3771638" "3870495" "3872012" "4157902" "4702754" "5125940" "5522909" "5549724" "5632793").PN. OR ("5888260").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S97	41	("0153535" "0439091" "1398685" "1530163" "1887052" "2087688" "4003836" "4018580" "4032455" "4039308" "4065276" "4261710" "4410341" "4414110" "4699715" "5106397" "5178656" "5522909" "5549722" "5549724" "5888260" "6397842" "6508052" "D401597" "D401942" "D403414" "D403416").PN. OR ("6808552").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/07/03 15:31
S98	15	("D403416").URPN.	USPAT	ADJ	ON	2018/07/03

						15:33
S99	0	"20030089233"	USPAT	ADJ	ON	2018/07/04 12:29
S100	3	"20030089233"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S101	26	"6833023"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/04 12:29
S102	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:08
S103	14	carbocations with sorbent with bromine	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:14
S104	0	a side forming a cross sectional shape of each of the first	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:47
S105	0	non of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S106	0	none of side forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S107	0	none of sides forming	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/09 13:56
S109	13	olson.in. and (alkali and promoter and earth).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S110	0	olson.in. and (alkali and promoter and earth with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S111	10	olson.in. and (alkali and promoter with vapor).clm.	US-PGPUB; USPAT	ADJ	ON	2018/07/17 16:22
S112	0	"2015008283"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S113	2	"20150082833"	US-PGPUB; USPAT	ADJ	ON	2018/07/23 06:26
S114	24	olson.in. and liquid.clm. and promoted	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:50

S115	75	remov\$4 with mercury and (br or bromine) with liquid with carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 07:54
S116	0	separating greater than "70" wt% of the mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S117	0	((separating greater) with (of the mercury)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:17
S118	20	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/07/23 09:43
S119	40	(during with after with mercury with sorbent)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:38
S120	304	sorbent with mercury and sorbent with boiler	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:39
S121	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:41
S122	18	before with burn\$4 with coal with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/01 17:42
S123	204	("0174348" "0202092" "0208011" "0224649" "0229159" "0298727" "0346765" "0347078" "0367014" "0537926" "0537998" "0541025" "0625754" "0647622" "0685719" "0688782" "0700888" "0744908" "0846338" "0894110" "0896876" "0911960" "0945331" "0945846" "1112547" "1167471" "1167472" "1183445" "1788466" "1984164" "20020065581" "20020114749" "20020184817" "20030088370" "20030103882" "20040003716" "20040013589" "20040086439" "20040219083" "20050039598" "20060047526" "20060210463" "2016821" "2059388" "2089599" "2511288" "3194629" "3288576" "3437476" "3599610" "3662523" "3725530" "3764496" "3823676" "3838190" "3849267" "3849537"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/01 17:42

		"3956458" "3961020" "3974254" "4040802" "4075282" "4094777" "4101631" "4115518" "4148613" "4174373" "4196173" "4226601" "4233274" "4272250" "4280817" "4305726" "4322218" "4377599" "4387653" "4394354" "4440100" "4472278" "4474896" "4519807" "4519995" "4555392" "4582936" "4602918" "4629721" "4693731" "4716137" "4741278" "4758418" "4764219" "4786483" "4804521" "4807542" "4824441" "4830829" "4873930" "4886519" "4892567" "4915818" "4933158" "4936047" "4964889" "5013358" "5024171" "5049163" "5116793" "5126300" "5137854" "5162598" "5190566" "5238488" "5350728" "5368617" "5409522" "5435980" "5447703" "5460643" "5505746" "5505766" "5571490").PN. OR ("5587003" "5618508" "5635150" "5659100" "5670122" "5733516" "5738834" "5787823" "5810910" "5897688" "5910292" "5989506" "6024931" "6083289" "6240859" "6258334" "6372187" "6375909" "6475451" "6521021" "6528030" "6533842" "6558454" "6610263" "6613110" "6719828" "6732055" "6737031" "6746531" "6790420" "6808692" "6848374" "6878358" "6942840" "6953494" "6962617" "6974564" "6975975" "7468170" "7507083" "7674442" "7758827" "7776301").PN.				
S124	1	"15573128"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:07
S125	2	"20110207597"	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/10/02 12:08
S126	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S127	71	sorbent with before with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:30
S128	234	"6953494"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:38
S129	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 17:40

S130	35	promoter with sorbent and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S131	28	promoter with sorbent with mercury and "30" g	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:19
S132	4	promoter with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:20
S133	4	promot\$4 with sorbent with mercury and ("30" g).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:23
S134	4	promot\$4 with sorbent with mercury and pre.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:41
S135	2	promot\$4 with sorbent with mercury and pre-heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/02 22:42
S136	2	promot\$4 with sorbent with mercury and pre heater	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S137	57	promot\$4 with sorbent with mercury and pre	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:36
S138	24	sorbent with preheat\$4 with coal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:39
S139	121	"5435980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 08:47
S140	23	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:28
S141	5	"14102896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 11:48

S142	7	"12429058"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:09
S143	4	"12202595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:23
S144	20	"12201595"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:24
S145	3	"14564860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:27
S146	1	"15978760"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:28
S147	1	"15589359"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:32
S148	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:37
S149	8	"15997091"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S150	6	"14712558"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 12:42
S151	2	"15951970"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:18
S152	4	"15382114"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:47
S153	1	"15853029"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 15:51

S154	2	"20070168213"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:18
S155	69	"4279873"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/03 18:42
S156	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 07:59
S157	4	"15295594"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 08:08
S158	1	("20180257030").PN.	US-PGPUB; USPAT	ADJ	ON	2018/10/04 09:31
S159	86	"5569436"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:32
S160	6	"5785935"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S161	8	"6475471"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 09:33
S162	53	"6103205"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:46
S163	0	pyrolysis with char with mercury with activated	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S164	17	pyrolysis with char with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:49
S165	121	pyrolysis with char with activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S166	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR;	ADJ	ON	2018/10/04 11:50

			FPRS; EPO; JPO			
S167	43	pyrolysis with char with activated carbon and mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 11:50
S168	118	pyrolysis with char with tire	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S169	58	pyrolysis with char with activated carbon and mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 12:04
S170	8	"20040081724"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 15:07
S171	4	"14128179"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/04 15:10
S172	84	activat\$4 carbon with boiler with coal and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S173	88	activat\$4 carbon with boiler with coal and (remov\$4 or filter\$4 or absorb\$4 or adsorb\$4) with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 13:27
S174	0	mercury with stabiliz\$4 with sulfur dioxide	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 14:23
S175	75	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/15 15:07
S176	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:48
S177	17	"8821819"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/16 06:51
S178	15	"8652235"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2018/10/16 06:55

			FPRS; EPO; JPO			
S179	93	"6136749"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/24 09:08
S180	4	"9757689"	US-PGPUB; USPAT	ADJ	ON	2018/10/24 12:37
S181	9	"8939388"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 09:59
S182	669	urea with inject\$4 with filter\$4 with exhaust	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:15
S183	2	urea with inject\$4 with filter\$4 with exhaust and urea with quench\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:16
S184	13	"3615165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:35
S185	136	urea with quench\$4 with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 10:39
S186	48	urea dust with scrub\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 11:25
S187	38	"6221155"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 12:04
S188	6	"9468886"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/10/29 14:12
S189	773	ammonium with remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:14
S190	108	ammonium with salt with remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:15

S191	45	ammonium with salt with remov\$4 with mercury and activated carbon	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:15
S192	42	"5556447"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:21
S193	174	"4500327"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:21
S194	72	"4500327" and ammonium	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:23
S195	3	anionic couterion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S196	3480	anionic counterion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S197	2422	anionic counterion and ammonium with salt	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S198	9	anionic counterion and ammonium with salt and remov\$4 with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:32
S199	52	"6960329"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/03 14:50
S200	4	"20040003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2018/12/06 11:23
S201	1	"45219176".FMID.	US-PGPUB; USPAT; FPRS	ADJ	ON	2018/12/06 13:32
S202	0	pyrolysis with char with activated carbon with mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/01/07 09:41
S203	284	(sorbent or activated carbon) with mercury and (diameter or size) with ("30"	US-PGPUB; USPAT;	ADJ	ON	2019/04/15 14:29

		or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and activated carbon	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S204	88	activat\$4 carbon with boiler with coal and (remov\$4 or filter\$4 or absorb\$4 or adsorb\$4) with mercury	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/04/15 14:29
S205	42	"6132790"	US-PGPUB; USPAT	ADJ	ON	2019/06/12 16:06
S206	19	remov\$4 with mercury and calcium nitrate with sorbent	US-PGPUB; USPAT	ADJ	ON	2019/06/12 16:55
S207	1	remov\$4 with mercury with calcium nitrate	US-PGPUB; USPAT	ADJ	ON	2019/06/12 16:57
S208	1	"20040146613"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/13 12:59
S209	71	("6372187").URPN.	USPAT	ADJ	ON	2019/06/18 10:24
S210	48	("6372187").URPN. and (iodide or HI)	USPAT	ADJ	ON	2019/06/18 10:25
S211	61	(iodide or HI) with inject\$4 and mercury with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/18 10:30
S212	85	(iodide or HI) with coal and mercury with remov\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/18 10:35
S213	131	"6558454"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/06/18 10:41
S214	5	"15295594"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 12:48
S215	82	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 16:29
S216	65	"4013516"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/07/30 21:01
S217	24	"4699896"	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2019/07/30 21:01

			EPO; JPO			
S218	2	"20120100053"	US-PGPUB; USPAT	ADJ	ON	2019/08/17 11:40
S219	1	"20130157845"	US-PGPUB; USPAT	ADJ	ON	2019/08/17 11:40
S220	204	coal with combust\$4 and sorbent with (iodine or iodide or HI)	US-PGPUB; USPAT	ADJ	ON	2019/09/04 12:15
S221	184	coal with combust\$4 and sorbent with (iodine or HI)	US-PGPUB; USPAT	ADJ	ON	2019/09/04 12:18
S222	184	coal with combust\$4 and sorbent with (iodine or HI) and (iodine or HI)	US-PGPUB; USPAT	ADJ	ON	2019/09/04 12:20
S223	0	electric utility coal combustion chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:06
S224	12	electric with coal combustion chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:07
S225	1755	electric with coal with combustion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:08
S226	219	electric with coal with combustion with chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 14:09
S227	89	electric with coal with combustion with chamber	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/09/04 14:09
S228	20	subbituminous with coal with chamber	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 19:42
S229	191	subbituminous with coal with combustion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 19:43
S230	1009	lignite with coal with combustion	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 20:09
S231	0	lignite with coal with combustion and mercury with sorbet	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/04 20:10
S232	54	lignite with coal with combustion and mercury with sorbent	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2019/09/04 20:10

EAST Search History

			EPO; JPO			
S233	4	"14917980"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/05 12:48
S234	246	"6878358"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/05 13:31
S250	25	"2012035853"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	ADJ	ON	2019/09/19 14:19
S251	326	(B01D53/025).cpc.	US-PGPUB; USPAT	ADJ	ON	2019/12/04 15:09

12/ 9/ 2019 10:27:41 AM

C:\Users\amillerharris\Documents\EAST\Workspaces\12429058.wsp

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1	Attorney Docket No: 4820.001US7	

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-5,556,447	9/17/1996	Srinivasachar, Srivats, et al.
	US-7,361,209	4/22/2008	Durham, Michael D, et al.
	US-20020114749A1	8/22/2002	Cole, Jerald Alan
	US-20030113239A1	6/19/2003	Pahlman, John E, et al.
	US-20030161771A1	8/28/2003	Oehr, Klaus H
	US-20040244657A1	12/9/2004	Srinivasachar, Srivats, et al.
	US-20070259781A1	11/8/2007	Sinha, Rabindra K
	US-20140099244A1	4/10/2014	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15/295,594, Final Office Action mailed 08-02-19", 18 pgs		
	"Application Serial No. 15/589,359, Notice of Allowance mailed 07-31-19", 7 pgs		
	"Application Serial No. 15/589,359, Response filed 07-16-19 to Non Final Office Action mailed 06-21-19", 7 pgs.		
	"Application Serial No. 15/974,343, Non Final Office Action mailed 08-21-19", 13 pgs		
	"Application Serial No. 15/974,343, Response Filed 07-10-2019 to Final Office Action mailed 01-14-19", 81 pgs		
	"Application Serial No. 15/997,091, Non Final Office Action mailed 08-23-19", 14 pgs		
	"Application Serial No. 15/997,091, Response filed 07-10-19 to Final Office Action mailed 01-11-19", 80 pgs.		
	"Application Serial No. 16/509,071, Non Final Office Action mailed 09-11-19", 21 pgs.		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 12/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

S/N 14/712,558PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION CONCERNING PRIOR OR COENDING APPLICATION(S)

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

Pursuant to the guidance of MPEP §§ 2001.06(b) and 2004(9), Applicant would like to bring the following additional application(s) to the Examiner's attention. The identification of these applications is not intended to suggest that the subject matter claimed in any listed application is, or has been, substantially similar to any claim or claims in the present application.

<u>Serial No./ Patent No.</u>	<u>Filing Date</u>	<u>Attorney Docket</u>	<u>Title</u>
16/509,071	July 11, 2019	4820.001U11	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
16/509,102	July 11, 2019	4820.001U12	TREATMENT OF COAL WITH MERCURY CONTROL ADDITIVES
16/574,935	September 18, 2019	4820.003US3	ACTIVATED CARBON SORBENT INCLUDING NITROGEN AND METHODS OF USING THE SAME
16/509,146	July 11, 2019	4820.007US5	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

/AMBER R ORLANDO/

12/09/2019

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

Receipt date: 11/15/2019

14/712,558 - GAU: 1776

COMMUNICATION CONCERNING PRIOR OR PENDING APPLICATIONS

Serial Number: 14/712,558

Filing Date: May 14, 2015

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Page 2

Dkt: 4820.001US7

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.

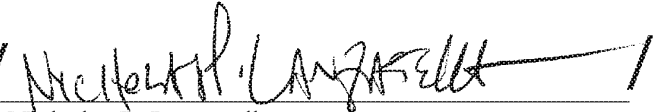
P.O. Box 2938

Minneapolis, MN 55402

(612) 349-9580

Date 11/15/2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

/AMBER R ORLANDO/

12/09/2019

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O./

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 2		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,471,412	11/12/2019	Olson, Edwin S, et al.
	US-20050274307A1	12/15/2005	Lissianski, Vitali Victor, et al.
	US-20190329179A1	10/31/2019	Olson, Edwin S., et al.
	US-20190329215A1	10/31/2019	Olson, Edwin S, et al.
	US-20190336913A1	11/7/2019	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 15/382,114, Response filed 10-3-19 to Final Office Action mailed 06-21-19", 23 pgs.		
	"Application Serial No. 15/589,359, Corrected Notice of Allowability mailed 10-11-19", 2 pgs.		
	"Application Serial No. 15/974,343, Corrected Notice of Allowability mailed 10-23-19", 2 pgs.		
	"Application Serial No. 15/974,343, Notice of Allowance mailed 09-17-19", 7 pgs.		
	"Application Serial No. 15/997,091, Corrected Notice of Allowability mailed 10-23-19", 3 pgs.		
	"Application Serial No. 15/997,091, Notice of Allowance mailed 09-18-19", 8 pgs.		
	"Application Serial No. 16/509,071, Response filed 10-3-2019 to Non Final Office Action mailed 09-11-19", 26 pgs.		
	"Application Serial No. 16/509,102, Amendment and Response filed 11-11-19 to Non Final Office Action mailed 10-23-19", 34 pgs.		
	"Application Serial No. 16/509,102, Non Final Office Action mailed 10-23-19", 26 pgs.		
	"Application Serial No. 16/509,146, Amendment and Response filed 11-11-19 to Non Final Office Action mailed 10-17-19", 34 pgs.		
	"Application Serial No. 16/509,146, Non Final Office Action mailed 10-17-19", 24 pgs.		
	"Ch. 35: Mercury, Hazardous Air Pollutants and other Multi-Pollutant Control", Tomei, G. L. (Ed.). Steam: its generation and use, Babcock and Wilcox Co., (2015), 24 pgs.		
	"Defendant's Answer and Counterclaim", Midwest Energy Emissions Corp., et al., v. Vistra Energy Corp., et al. - Case 1:19-cv-01334-RGA, (10-09-19), 71 pgs.		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 12/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 2	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Original Complaint for Patent Infringement", Midwest Energy Emissions Corp., et al., v. Vistra Energy Corp., et al. - Case 1:19-cv-01334-UNA, (07-17-19), 31 pgs.	
	"Plaintiff's Answer to Defendant's Counterclaims", Midwest Energy Emissions Corp., et al., v. Vistra Energy Corp., et al. - Case 1:19-cv-01334-RGA, (10-30-19), 37 pgs.	
	OLSON, E.S., et al., "Chemical mechanisms in mercury emission control technologies", J. Phys. IV France 107, Proc. of the XIth Intl. Conference on Heavy Metals in the Environment Volume II, pp. 979-982, (2003), 6 pgs.	
	OLSON, EDWIN S., "Abstract - Multiple Site Model for Flue Gas - Mercury interactions on Activated Carbons: The Basic Site", Abstracts of Papers Part 1, 225th ACS National Meeting, New Orleans, LA, (2003), 3 pgs.	
	OLSON, EDWIN S., et al., "An Improved Model for Flue Gas - Mercury Interactions on Activated Carbons", Proceedings of the Combined Power Plant Air Pollutant Control Mega Symposium, (May 2003), 8 pgs.	
	OLSON, EDWIN, et al., "The Multiple Site Model for Flue Gas - Mercury Interactions on Activated Carbons: The Basic Site", Fuel Chemistry Preprints, 48(1), (2003), 3 pgs.	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

12/09/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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

POWER OF ATTORNEY BY APPLICANT

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

Application Number

Filing Date

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

21186

OR

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

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

- ☒ The address associated with the above mentioned Customer Number.

OR

- ☐ The address associated with Customer Number:

OR

☐ Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

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

Midwest Energy Emissions Corp.

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

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

Signature

Date

(Optional)

Name

Title

Chief Technology Officer

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

- ☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

RESPONSE TO EXAMINER'S REASONS FOR ALLOWANCE

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

In the Notice of Allowance dated December 13, 2019 the Examiner has set forth "Reasons for Allowance." Applicant agrees that the claims are patentable over the references of record, but does not necessarily agree with the reasons provided in the allowance, which are the Examiner's reasons rather than Applicant's and are in no way to be interpreted as admitted by Applicant. Applicant respectfully submits that the subject matter of each of the allowed claims is patentable for its respective recitation of the claimed combination as a whole. That is, the patentability of each claim rests on the combination of recited elements and limitations. As such, Applicant submits that no one element or limitation in particular should be deemed to impart or be required for patentability of the claims. Furthermore, Applicant submits that the dependent claims are allowable not only for their dependence from the allowed independent claims, but also for the additional subject matter recited in each of those dependent claims.

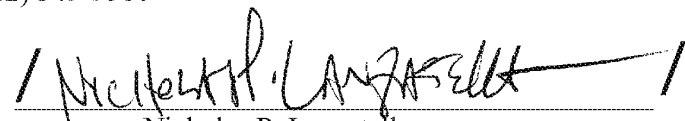
If necessary, please charge any additional fees or credit overpayment to Deposit Account 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 12/19/2019

By



Nicholas P. Lanzatella
Reg. No. 63,803

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket No.: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION RE: FEE ADDRESS

Mail Stop Issue Fee
Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

In response to the Notice of Allowance and Issue Fee Due, please record the Fee Address under the provisions of 37 CFR 1.363 as the following:

Customer Number 21186

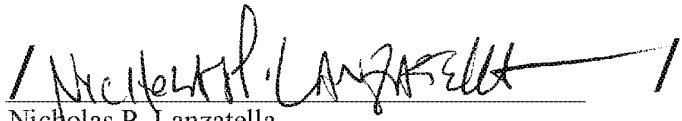
Please direct any inquiries to the undersigned attorney at (612) 349-9580.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 12/19/2019

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:CMG:dmj

PART B - FEE(S) TRANSMITTAL

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

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

By fax, send to: (571)-273-2885

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

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

21186 7590 12/13/2019
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

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.

Diana Johnson	(Typed or printed name)
/Diana Johnson/	(Signature)
12/19/2019	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934

TITLE OF INVENTION: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	03/13/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
ORLANDO, AMBER ROSE	1776	095-14-2000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☒ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

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

1 Schwegman Lundberg

2 & Woessner, P.A.

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)

Midwest Energy Emissions Corp.

Lewis Center, OH

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

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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

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

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 19-0743

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

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

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

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

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

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

Authorized Signature Nicholas P. Lanzatella

Date 12/19/2019

Typed or printed name Nicholas P. Lanzatella

Registration No. 63,803

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.
Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.:	4820.001US7	Serial No.:	14/712,558
Filed:	May 14, 2015	Due Date:	March 13, 2020
Examiner:	Amber Orlando	Group Art Unit:	1776
Customer No.:	21186	Confirmation No.:	1934

Notice of Allowance Date: December 13, 2019

Mail Stop Issue Fee

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

We are transmitting herewith the following:

- ☒ Authorization to charge Deposit 19-0743 in the amount of \$1,000.00 to cover the Large Entity Issue Fee Payment.
- ☒ Issue Fee Transmittal (Form PTOL-85).
- ☒ Communication Re: Fee Address (1 page).
- ☒ Response to Examiner's Reasons for Allowance (1 pg.)
- ☒ Power of Attorney (1 pg.)
- ☒ Statement Under 37 CFR 3.73 (c) (2 pgs.)

Please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
Customer No.: 21186
NPL:CMG:dmj

By Nicholas P. Lanzatella
Nicholas P. Lanzatella
Reg. No. 63,803

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 19th day of December, 2019.

Diana Johnson
Name

/Diana Johnson/
Signature

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		James Lee Shands/Diana Johnson		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1000

Electronic Acknowledgement Receipt

EFS ID:	38084993
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	James Lee Shands/Diana Johnson
Filer Authorized By:	James Lee Shands
Attorney Docket Number:	4820.001US7
Receipt Date:	19-DEC-2019
Filing Date:	14-MAY-2015
Time Stamp:	12:33:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 1000
RAM confirmation Number	E2019BIC34144702
Deposit Account	190743
Authorized User	Diana Johnson
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		4820001US7IssuefeeSigned.pdf	3827427	yes	7
			453553cc9eab728193d8f067d924efbb039e3cb0		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Assignee showing of ownership per 37 CFR 3.73		6	7	
	Power of Attorney		5	5	
	Miscellaneous Incoming Letter		4	4	
	Miscellaneous Incoming Letter		3	3	
	Issue Fee Payment (PTO-85B)		2	2	
	Transmittal Letter		1	1	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30115	no	2
			e2b6a766a4fcd8c0b837caa7713538666a4f47d		
Warnings:					
Information:					
Total Files Size (in bytes):			3857542		

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.

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

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Midwest Energy Emissions Corp.

Application No./Patent No.: 14/712,558

Filed/Issue Date: May 14, 2015

Titled: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Midwest Energy Emissions Corp. a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
 - ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
 - ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel, Frame, or for which a copy thereof is attached.

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: John Henry Pavlish To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040495, Frame 0857 - 0863, or for which a copy thereof is attached.

2. From: Michael J. Holmes To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040496, Frame 0056 - 0062, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Edwin S. Olson To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at
Reel 040496, Frame 0211 - 0217, or for which a copy thereof is attached.

4. From: Energy & Environmental Research Center Foundation To: MIDWEST ENERGY EMISSIONS CORP.

The document was recorded in the United States Patent and Trademark Office at
Reel 042647, Frame 0351, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature

Nicholas P. Lanzatella
Printed or Typed Name

12/19/2019
Date

USPTO Reg. No. 63,803
Title or Registration Number



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7

CONFIRMATION NO. 1934

POA ACCEPTANCE LETTER



OC000000113539464

Date Mailed: 12/27/2019

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/19/2019.

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

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

/vnguyen/



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/712,558	05/14/2015	Edwin S. Olson	4820.001US7	1934
21186	7590	01/15/2020		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			01/15/2020	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):

SLW@blackhillsip.com
uspto@slwip.com

**UNITED STATES DEPARTMENT OF COMMERCE****U.S. Patent and Trademark Office**

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR/ PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
14/712,558	05/14/2015	Olson et al.	4820.001US7

SCHWEGMAN LUNDBERG & WOESSNER, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402		EXAMINER	
		AMBER R ORLANDO	
		ART UNIT	PAPER
		1776	20200109

DATE MAILED: _____

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

Commissioner for Patents

IDS Considered and attached

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 4		Attorney Docket No: 4820.001US7

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	~~US-2002/01505a1~~	10/17/2002	Pahlman, John E, et al. 2002010516
	US-20030057293A1	3/27/2003	Boecking, Friedrich
	US-20070167309A1	7/19/2007	Olson, Edwin S.
	US-20090031708A1	2/5/2009	Schmidt, Darren D.
	~~US-2,456,272A1~~	2/7/2002	Pahlman, John, et al. 2,456,272
	US-3,341,185	9/12/1967	Kennedy, Sr, Walter L
	US-3,935,708	2/3/1976	Harrewijne, A., et al.
	US-4,342,192	8/3/1982	Heyn, K., et al.
	US-4,772,455	9/20/1988	Izumi, Kazuo, et al.
	US-4,956,162	9/11/1990	Smith, Wallace B, et al.
	US-5,480,619	1/2/1996	Johnson, Dennis, et al.
	US-5,500,306	3/19/1996	Hsu, M. S., et al.
	US-5,695,726	12/9/1997	Lerner, B J.
	US-6,001,762	12/14/1999	Harmer, Mark Andrew, et al.
	US-6,013,593	1/11/2000	Lee, Hoo-kun, et al.
	US-6,074,974	6/13/2000	Lee, Jung-min, et al.
	US-6,342,462	1/29/2002	Kulprathipanja, Santi
	US-6,475,451	11/5/2002	Leppin, Dennis, et al.
	US-6,576,585	6/10/2003	Fischer, Stefan, et al.
	US-6,579,507	6/17/2003	Pahlman, John, et al.
	US-6,596,661	7/22/2003	Neufert, Ronald
	US-6,610,263	8/26/2003	Pahlman, John, et al.
	US-7,017,330	3/28/2006	Bellows, James C.
	US-7,124,591	10/24/2006	Baer, Joan Mae, et al.
	US-7,247,279	7/24/2007	Pahlman, John, et al.
	US-7,293,414	11/13/2007	Huber, David J.
	US-7,435,286	10/14/2008	Olson, Edwin S., et al.
	US-7,442,239	10/28/2008	Armstrong, J. A., et al.
	US-8,080,088	12/20/2011	Srinivasachar, Srivats
	US-8,173,566	5/8/2012	Olson, Edwin S, et al.
	US-9,662,629	5/30/2017	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2327602A1	6/6/2001	Robles, Antonio	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

01/09/2020

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 2 of 4		Attorney Docket No: 4820.001US7

FOREIGN PATENT DOCUMENTS				
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CN-101053820A	10/17/2007	Geng, Jianming Qian	
	CN-101293196A	10/29/2008	Zhenglong, Yang	
	CN-101816922A	9/1/2010	Song, Hu, et al.	
	CN-102413899A	4/11/2012	Olson, Edwin S, et al.	
	CN-104519410A	4/15/2015	Olson, Edwin S., et al.	
	CN-104619410B	5/4/2016	Olson, Edwin S, et al.	
	CN-1048173A	1/2/1991	Guoguan, et al.	
	CN-105188910A	12/23/2015	Olson, Edwin S.	
	DE-3816600A1	11/23/1989	Kaizik, Alfred, Dr., et al.	
	EP-1458474	9/22/2004	Hammel, Charles F, et al.	
	JP-09256812	9/30/1997	Masanori, K., et al.	
	JP-544868A	1/13/1979	Seki, Michiharu, et al.	
	KR-1020027006149	7/2/2002	Tsuyoshi, O., et al.	
	WO-0228513A2	4/11/2002	Pahlman, John E, et al.	
	WO-03072241A1	9/4/2003	Hammel, Charles F, et al.	
	WO-2004094024A2	11/4/2004	Olson, Edwin, et al.	
	WO-2009018539A3	2/5/2009	Schmidt, Darren D.	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1	
	"Application Serial No. 10/554,018 Response filed 11-01-10 to Final Office Action mailed 04-27-10", 17 pgs		
	"Application Serial No. 10/554,018, Final Office Action mailed 04-27-10", 8 pgs		
	"Application Serial No. 10/554,018, Non Final Office Action mailed 10-06-09", 8 pgs		
	"Application Serial No. 10/554,018, Notice of Allowance mailed 01-19-12", 7 pgs		
	"Application Serial No. 10/554,018, Response filed 02-08-10 to Non Final Office Action mailed 10-06-09", 9 pgs		
	"Application Serial No. 10/554,018, Response filed 08-10-09 to Restriction Requirement mailed 06-09-09", 1 pg		
	"Application Serial No. 10/554,018, Restriction Requirement mailed 06-09-09", 5 pgs		
	"Application Serial No. 12/184,860, Examiner Interview Summary mailed 04-05-11", 3 pgs		
	"Application Serial No. 12/184,860, Final Office Action mailed 05-11-11", 15 pgs		
	"Application Serial No. 12/184,860, Non Final Office Action mailed 01-19-11", 14 pgs		
	"Application Serial No. 12/184,860, Response filed 04-07-11 to Non Final Office Action mailed 01-19-11", 12 pgs		

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 3 of 4	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 12/184,860, Response filed 07-08-11 to Final Office Action mailed 05-11-11", 11 pgs	
	"Application Serial No. 14/564,860, Final Office Action mailed 11-17-16", 4 pgs	
	"Application Serial No. 14/564,860, Non Final Office Action mailed 07-12-16", 6 pgs	
	"Application Serial No. 14/564,860, Notice of Allowance mailed 01-30-17", 6 pgs	
	"Application Serial No. 14/564,860, Preliminary Amendment filed 12-10-14", 8 pgs	
	"Application Serial No. 14/564,860, Response filed 05-06-16 to Restriction Requirement mailed 03-16-16", 9 pgs.	
	"Application Serial No. 14/564,860, Response filed 10-03-16 to Non Final Office Action mailed 07-12-16", 11 pgs	
	"Application Serial No. 14/564,860, Restriction Requirement mailed 03-16-16", 5 pgs	
	"Application Serial No. 15/452,527, Preliminary Amendment filed 03-08-17", 3 pgs.	
	"Application Serial No. PCT/US04/12828, International Search Report mailed 10/22/2004", 2 pgs	
	"Application Serial No. PCT/US2014/019916, International Preliminary Report on Patentability mailed 09-17-15", 14 pgs	
	"Canadian Application Serial No. 2,523,132, Office Action mailed 07-18-11", 3 pgs	
	"Canadian Application Serial No. 2,523,132, Response filed 01-16-12 to Office Action mailed 7-18-11", 5 pgs	
	"Canadian Application Serial No. 2,707,363, First Examiners Report Received 6/16/11", 2 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 02-26-16 to Office Action mailed 09-09-15", 13 pgs.	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 09-09-15", 3 pgs	
	"Canadian Application Serial No. 2,871,422, Office Action mailed 12-22-16", 5 pgs	
	"Canadian Application Serial No. 2,871,422, Response filed 08-28-15 to Canadian Office Action mailed 04-02-15", 22 pgs	
	"Chinese Application Serial No. 200480017704.4, Office Action mailed 12-08-11", (w/ English Translation), 6 pgs	
	"Chinese Application Serial No. 200480017704.4, Response filed 01-20-12 to Office Action mailed 12-08-12", (w/ English Translation of Amended Claims), 10 pgs.	
	"Chinese Application Serial No. 201380033231.6, Office Action mailed 09-21-15", w/ Partial English Translation, 6 pgs	
	"Chinese Application Serial No. 201380033231.6, Response filed 01-14-16 to Office Action mailed 09-21-15", w/English Claims, 7 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 07-12-17", W/ English Translation, 8 pgs	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 07-25-16", (With English Translation), 4 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 4 of 4	Attorney Docket No: 4820.001US7	

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS		
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 12-23-16", 24 pgs.	
	"Chinese Application Serial No. 201480025701.9, Office Action mailed 12-23-16", W/ English Translation, 39 pgs	
	"Chinese Application Serial No. 201480025701.9, Response filed 09-15-17 to Office Action mailed 07-12-17", w/ English Translation, 21 pgs	
	"European Application Serial No. 13719338.9, Office Action mailed 05-12-17", 6 pgs	
	"European Application Serial No. 13719338.9, Office Action mailed 12-19-14", 2 pgs.	
	"European Application Serial No. 13719338.9, Response filed 06-29-15 to Office Action mailed 12-19-14", 19 pgs.	
	"European Application Serial No. 14711106.6, Communication Pursuant to Article 94(3) EPC mailed 02-22-17", 6 pgs	
	"European Application Serial No. 14711106.6, Response filed 08-17-17 to Communication Pursuant to Article 94(3) EPC mailed 02-22-17", 10 pgs	
	"International Application No. PCT/US2008/071986, International Search Report mailed 01-30-09", 3 pgs	
	OLSON, DAVID, et al., "The reduction of gas phase air toxics from combustion and incineration sources using the MET-Mitsui-BF activated coke process", Fuel Processing Technology, (2000), 13 pgs	
	STRENG, SABINE, et al., "Toxics control by activated charcoal within the "System Dusseldorf" full scale experience", B. Fuel Processing Technology, (1994), 14 pgs	
	TSUJI, K, et al., "The Activated Coke Process for Combined SOx/NOx/Air Toxics Reduction", Air and Water Management Assoc., (March 10, 1993), 27 pgs	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED

10/15/2018

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

S/N 14/712,558

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: Amber Orlando

Serial No.: 14/712,558

Group Art Unit: 1776

Filed: May 14, 2015

Docket: 4820.001US7

Customer No.: 21186

Confirmation No.: 1934

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

COMMUNICATION RE: UPDATE TO APPLICATION DATA SHEET

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

Applicants hereby request that the information provided on the Application Data Sheet filed in the above-referenced application on May 14, 2015, be updated with the information as provided on the enclosed marked up Application Data Sheet.

We therefore submit a marked up copy of the Application Data Sheet which shows an update to the applicant information.

Once this request is entered, it is respectfully requested that the USPTO update their records and provide confirmation of the above request by way of an Updated Filing Receipt.

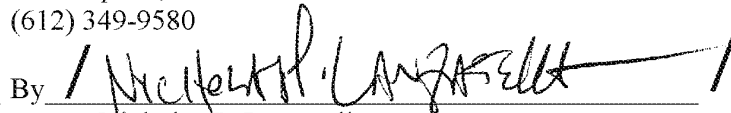
It is believed that no fee is required to fulfill this request, however, if necessary, please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

Schwegman Lundberg & Woessner, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date 2020-01-28

By



Nicholas P. Lanzatella
Reg. No. 63,803

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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:				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
Residence Information (Select One) ☐ US Residency ☐ Non US Residency ☐ Active US Military Service				
City		State/Province	Country of Residence	
Mailing Address of Inventor:				
Address 1				
Address 2				
City		State/Province		
Postal Code		Country		

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	
Email Address	

Application Information:

Title of the Invention			
Attorney Docket Number		Small Entity Status Claimed	☐
Application Type			
Subject Matter			
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	
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.		

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

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). Enter either 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	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number			

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Foreign Priority Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	

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.

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the POX 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	Parent Filing Date (YYYY-MM-DD)	Access Code (if applicable)

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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.

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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY	

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.

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: Midwest Energy Emissions Corp.				
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.				
☒ 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:				
☐ Deceased		☐ Legally incapacitated		
Name of the Deceased or Legally Incapacitated Inventor :				
If the Applicant is an Organization check here: ☒				
Organization Name: Midwest Energy Emissions Corp.				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information:				
Address 1	~~670 D Enterprise Dr~~ 1810 Jester Dr			
Address 2				
City	~~Lewis Center~~ Corsicana	State/Province	OH TX	
Country	United States of America	Postal Code	~~43035~~ 75109	
Phone Number				
Email Address				

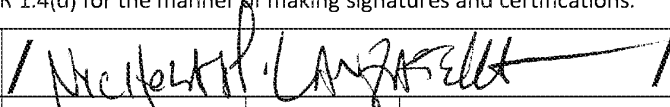
Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4820.001US7
	Application Number	14/712,558
Title of Invention		
SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

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.

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.				
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.				
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		Postal Code		
Phone Number		Fax Number		
Email Address				

Signature:

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 <u>INITIAL</u> filing of the application and either box A or B is <u>not</u> 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, <u>all</u> 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 <u>all</u> joint inventor-applicants. See 37 CFR 1.4(d) for the manner of making signatures and certifications.					
Signature				Date (YYYY-MM-DD)	2020-01-28
First Name	Nicholas	Last Name	Lanzatella	Registration Number	63,803

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 22313-14**

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

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Midwest Energy Emissions Corp.

Application No./Patent No.: 14/712,558

Filed/Issue Date: May 14, 2015

Titled: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Midwest Energy Emissions Corp. a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
 - ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
 - ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventor To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040496, Frame 0056, or for which a copy thereof is attached.

2. From: Inventor To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at

Reel 040495, Frame 0857, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Inventor To: Energy & Environmental Research Center Foundation

The document was recorded in the United States Patent and Trademark Office at
Reel 040496, Frame 0211, or for which a copy thereof is attached.

4. From: Energy and Environmental Research Center Foundation To: Midwest Energy Emissions Corp.

The document was recorded in the United States Patent and Trademark Office at
Reel 042647, Frame 0351, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature

Nicholas P. Lanzatella

Printed or Typed Name

2020-01-28

Date

USPTO Reg. No. 63,803

Title or Registration Number

Electronic Acknowledgement Receipt

EFS ID:	38422475
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Garrett M. Hall/Diana Johnson
Filer Authorized By:	Garrett M. Hall
Attorney Docket Number:	4820.001US7
Receipt Date:	28-JAN-2020
Filing Date:	14-MAY-2015
Time Stamp:	16:03:05
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		4820001US7UpdatedADSsigned.pdf	358309 8d8fd94a2ca44d77fac82cbacb824973484cf8fe	yes	10

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Transmittal Letter	1	1	
Request for Corrected Filing Receipt	2	2	
Application Data Sheet	3	8	
Assignee showing of ownership per 37 CFR 3.73	9	10	
Warnings:			
Information:			
Total Files Size (in bytes):		358309	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US7

Filed: May 14, 2015

Examiner: Amber Orlando

Customer No.: 21186

Serial No.: 14/712,558

Group Art Unit: 1776

Confirmation No.: 1934

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

We are transmitting herewith the attached:

X Communication Re: Update to Application Data Sheet (1 Pg.).

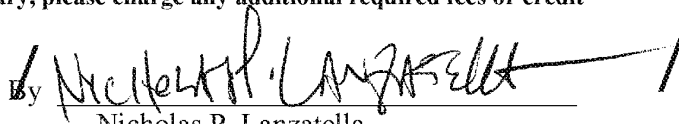
X Marked Up Application Data Sheet (6 Pgs.).

X Statement Under 37 CFR 3.73 (c) (2 pgs.)

It is believed that no additional fee is required. However, if necessary, please charge any additional required fees or credit overpayment to Deposit Account No. 19-0743.

Schwegman Lundberg & Woessner, P.A.

Customer No.: 21186

By 
Nicholas P. Lanzatella
Reg. No. 63,803

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 28TH day of January, 2020.

Diana Johnson

Name

/Diana Johnson/

Signature



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
14/712,558	05/14/2015	1776	3420	4820.001US7	20	2

CONFIRMATION NO. 1934 CORRECTED FILING RECEIPT

21186

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402



CC000000114329074

Date Mailed: 01/30/2020

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)

Edwin S. Olson, Grand Forks, ND;
Michael J. Holmes, Thompson, ND;
John Henry Pavlish, East Grand Forks, MN;

Applicant(s)

Midwest Energy Emissions Corp., Corsicana, OH;

Power of Attorney: The patent practitioners associated with Customer Number 21186

Domestic Priority data as claimed by applicant

This application is a CON of 14/318,270 06/27/2014 PAT 9757689
which is a CON of 13/966,768 08/14/2013 PAT 8821819
which is a CON of 13/427,665 03/22/2012 PAT 8512655
which is a CON of 12/419,219 04/06/2009 PAT 8168147
which is a CON of 12/201,595 08/29/2008 ABN
which is a DIV of 11/209,163 08/22/2005 PAT 7435286
which claims benefit of 60/605,640 08/30/2004

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

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

If Required, Foreign Filing License Granted: 05/26/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/712,558**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Preliminary Class

095

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 Assets Control, 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.



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/712,558	05/14/2015	1776	3420	4820.001US7	20	2

CONFIRMATION NO. 1934 CORRECTED FILING RECEIPT

21186

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402



CC000000114329138

Date Mailed: 01/31/2020

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)

Edwin S. Olson, Grand Forks, ND;
Michael J. Holmes, Thompson, ND;
John Henry Pavlish, East Grand Forks, MN;

Applicant(s)

Midwest Energy Emissions Corp., Corsicana, TX;

Power of Attorney: The patent practitioners associated with Customer Number 21186

Domestic Priority data as claimed by applicant

This application is a CON of 14/318,270 06/27/2014 PAT 9757689
which is a CON of 13/966,768 08/14/2013 PAT 8821819
which is a CON of 13/427,665 03/22/2012 PAT 8512655
which is a CON of 12/419,219 04/06/2009 PAT 8168147
which is a CON of 12/201,595 08/29/2008 ABN
which is a DIV of 11/209,163 08/22/2005 PAT 7435286
which claims benefit of 60/605,640 08/30/2004

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

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

If Required, Foreign Filing License Granted: 05/26/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/712,558**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Preliminary Class

095

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 Assets Control, 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.

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 3 of 9		Attorney Docket No: 3338.005US7

US PATENT DOCUMENTS

Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-6,953,494	10/11/2005	Nelson Jr., Sidney, et al.
	US-6,960,329	11/1/2005	Sellakumar, Kumar M.
	US-7,081,434	7/25/2006	Sinha, Rabindra K.
	US-7,211,707	5/1/2007	Axtell, Holly C, et al.
	US-7,435,286	10/14/2008	Olson, Edwin S, et al.
	US-7,479,263	1/20/2009	Chang, Shih-ger, et al.
	US-7,514,052	4/7/2009	Lissianski, Vitali Victor, et al.
	US-7,521,032	4/21/2009	Honjo, Shintaro, et al.
	US-7,544,338	6/9/2009	Honjo, S., et al.
	US-7,563,311	7/21/2009	Graham, James R
	US-7,611,564	11/3/2009	Mcchesney, Joe, et al.
	US-7,622,092	11/24/2009	Honjo, S., et al.
	US-7,722,843	5/25/2010	Srinivasachar, S.
	US-7,767,174	8/3/2010	Lui, K., et al.
	US-7,780,765	8/24/2010	Srinivasachar S., et al.
	US-8,007,749	8/30/2011	Chang, Shih-ger, et al.
	US-8,168,147	5/1/2012	Olson, Edwin S, et al.
	US-8,168,149	5/1/2012	Gal, Eli, et al.
	US-8,216,535	7/10/2012	Pollack, Nicholas R, et al.
	US-8,512,655	8/20/2013	Olson, Edwin S, et al.
	US-8,652,235	2/18/2014	Olson, Edwin S, et al.
	US-8,821,819	9/2/2013 ⁺	Olson, Edwin S, et al.
	US-9,011,805	4/21/2015	Olson, Edwin S, et al.

Change(s) applied
to document,
/CL/
12/30/2019

FOREIGN PATENT DOCUMENTS

Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-1099490A1	4/21/1981	DeJong, et al.	
	CA-2150529A1	12/29/1995	Scherer, Volker, et al.	
	CA-2400898A1	8/30/2001	Maes, Rudy J, et al.	
	DE-10233173A1 (w/ English Abstract)	2/12/2004	Vosteen, Bernhard, et al.	
	DE-202012003747U1 (w/ English Abstract)	11/15/2012	Bluecher GmbH	
	DE-3426059A1 (w/ English Abstract)	1/16/1986	Seipenbusch, Jurgen, et al.	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 06/27/2017

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

Receipt date: 12/04/2017

14/712,558 - GAU: 1776

Modified form PTO/SB/08A(04-07) OMB 851-0031
US Patent & 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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	14/712,558
	Filing Date	May 14, 2015
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 4	Attorney Docket No: 4820.001US7	

US PATENT DOCUMENTS

Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
		01/2002	Addink
	~~US-2002/01505A1~~	~~10/17/2002~~	~~Pahlman, John E, et al. 2002010516~~
	US-20030057293A1	3/27/2003	Boecking, Friedrich
	US-20070167309A1	7/19/2007	Olson, Edwin S.
	US-20090031708A1	2/5/2009	Schmidt, Darren D.
	~~US-2,456,272A1~~	~~2/7/2002~~	~~Pahlman, John, et al. 2,456,272 Gregory~~
	US-3,341,185	9/12/1967	Kennedy, Sr, Walter L
	US-3,935,708	2/3/1976	Harrewijne, A., et al.
	US-4,342,192	8/3/1982	Heyn, K., et al.
	US-4,772,455	9/20/1988	Izumi, Kazuo, et al.
	US-4,956,162	9/11/1990	Smith, Wallace B, et al.
	US-5,480,619	1/2/1996	Johnson, Dennis, et al.
	US-5,500,306	3/19/1996	Hsu, M. S., et al.
	US-5,695,726	12/9/1997	Lerner, B J.
	US-6,001,762	12/14/1999	Harmer, Mark Andrew, et al.
	US-6,013,593	1/11/2000	Lee, Hoo-kun, et al.
	US-6,074,974	6/13/2000	Lee, Jung-min, et al.
	US-6,342,462	1/29/2002	Kulprathipanja, Santi
	US-6,475,451	11/5/2002	Leppin, Dennis, et al.
	US-6,576,585	6/10/2003	Fischer, Stefan, et al.
	US-6,579,507	6/17/2003	Pahlman, John, et al.
	US-6,596,661	7/22/2003	Neufert, Ronald
	US-6,610,263	8/26/2003	Pahlman, John, et al.
	US-7,017,330	3/28/2006	Bellows, James C.
	US-7,124,591	10/24/2006	Baer, Joan Mae, et al.
	US-7,247,279	7/24/2007	Pahlman, John, et al.
	US-7,293,414	11/13/2007	Huber, David J.
	US-7,435,286	10/14/2008	Olson, Edwin S., et al.
	US-7,442,239	10/28/2008	Armstrong, J. A., et al.
	US-8,080,088	12/20/2011	Srinivasachar, Srivats
	US-8,173,566	5/8/2012	Olson, Edwin S, et al.
	US-9,662,629	5/30/2017	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS

Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1
	CA-2327602A1	6/6/2001	Robles, Antonio	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 01/09/2020

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. † Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/



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.
14/712,558	03/17/2020	10589225	4820.001US7	1934

21186 7590 02/26/2020
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 1 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Edwin S. Olson, Grand Forks, ND;
Midwest Energy Emissions Corp., Corsicana, TX;
Michael J. Holmes, Thompson, ND;
John Henry Pavlish, East Grand Forks, MN;

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.

Patent 10,589,225 B2

PATENT

IN UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No.: 10,589,225 B2

Docket No: 4820.001US7

Issue Date: Mar. 17, 2020

Patentee: Midwest Energy Emissions Corp.

Customer No.: 21186

Confirmation No.: 1934

Title SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

REQUEST FOR CERTIFICATE OF CORRECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
ATTN: CERTIFICATE OF CORRECTION BRANCH

It is requested that a Certificate of Correction be issued correcting printing errors appearing in the above-identified United States patent. A copy of the text of the Certificate in the suggested form is enclosed.

Authorization is given to charge Deposit Account No. 19-0743 in the amount of \$160.00 to cover the Certificate of Correction Fee.

Issuance of the Certificate of Correction would neither expand nor contract the scope of the claims as properly allowed, and re-examination is not required.

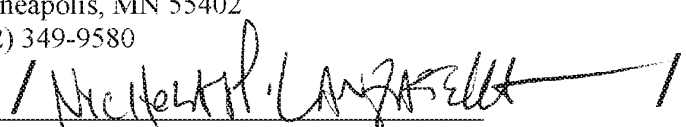
The Examiner is authorized to charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully Submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date : _____

By: _____


Nicholas P. Lanzatella
Reg. No: 63,803

CERTIFICATE UNDER 37 CFR § 1.8: The undersigned hereby certifies that this correspondence is filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450, on this _____ day of October 2020

Name

Signature

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.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO : 10,589,225 B2

Page (1) of 2

DATED : Mar. 17, 2020

INVENTOR(S) : Olson et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the face page, in "Related U.S. Application Data", in column 1, line 1, delete "(60)" and insert --(63)-- therefor

On page 3, in column 2, under "Other Publications", line 19, delete "'CO2'" and insert --CO₂-- therefor

On page 4, in column 1, under "Other Publications", line 55, delete "Jan. 15, 2010" and insert --Jul. 15, 2010-- therefor

On page 4, in column 2, under "Other Publications", line 39, delete "Actioin" and insert --Action-- therefor

On page 5, in column 1, under "Other Publications", line 12, delete "nanocomposites", and insert --nanocomposites--,-- therefor

On page 5, in column 1, under "Other Publications", line 20, delete "Poiypyrrole" and insert --Polypyrrole-- therefor

On page 5, in column 1, under "Other Publications", line 28, delete "Nanocomposites" and insert --Nanocomposites-- therefor

On page 5, in column 1, under "Other Publications", line 32, delete "nanocomposite" and insert --nanocomposite-- therefor

On page 5, in column 1, under "Other Publications", line 56, delete "chernistry", and insert --chemistry--,-- therefor

On page 5, in column 1, under "Other Publications", line 58, delete "SiO2-TiO2" and insert --SiO₂-TiO₂-- therefor

MAILING ADDRESS OF SENDER:

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
Minneapolis, MN 55402

Atty Docket No: 4820.001US7

PATENT NO. 10,589,225

No. of additional copies



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.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO : 10,589,225 B2

Page (2) of 2

DATED : Mar. 17, 2020

INVENTOR(S) : Olson et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 5, in column 2, under "Other Publications", line 31, delete ""Effectsof" and insert --
"Effects of-- therefor

On page 5, in column 2, under "Other Publications", line 32, delete "Reducton" and insert --
Reduction-- therefor

On page 6, in column 2, under "Other Publications", line 48, delete "Reponse" and insert --
Response-- therefor

On page 7, in column 1, under "Other Publications", line 1, delete "perforance" and insert --
performance-- therefor

On page 7, in column 1, under "Other Publications", line 7, delete "CaoI" and insert --Coal-- therefor

On page 7, in column 1, under "Other Publications", line 12, delete "CO2" and insert --CO₂-- therefor

In the drawings, Sheet 6 of 10, Fig. 6, delete "O2" and insert --O₂-- therefor

In column 23, lines 66-67, in Claim 1, delete "mercury-containing," and insert --mercury-
containing-- therefor

MAILING ADDRESS OF SENDER:

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
Minneapolis, MN 55402

Atty Docket No: 4820.001US7

PATENT NO. 10,589,225

No. of additional copies



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Midwest Energy Emissions Corp.

Examiner: Amber R. Orlando

Patent No.: 10,589,225 B2

Group Art Unit: 1776

Issue Date: Mar. 17, 2020

Docket No: 4820.001US7

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

ATTN: CERTIFICATE OF CORRECTION BRANCH

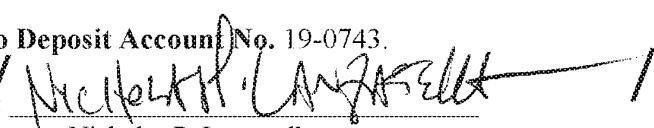
We are transmitting herewith the attached:

- ☒ Authorization to charge Deposit Account No. 19-0743 in the amount of \$160.00 to cover the Certificate of Correction Fee.
- ☒ Request for Certificate of Correction. (1 pg.)
- ☒ Certificate of Correction Form - PTO-1050 (2 pgs.)

Please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.

Customer No: 21186

By: 

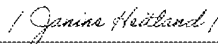
Nicholas P. Lanzatella

Reg. No: 63,803

CERTIFICATE UNDER 37 CFR § 1.8: The undersigned hereby certifies that this correspondence is filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450, on this 19th day of October 2020.

Janine Heitland

Name



Signature

Electronic Patent Application Fee Transmittal				
Application Number:		14712558		
Filing Date:		14-May-2015		
Title of Invention:		SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		
First Named Inventor/Applicant Name:		Edwin S. Olson		
Filer:		Susan Yee/Janine Heitland		
Attorney Docket Number:		4820.001US7		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
CERTIFICATE OF CORRECTION	1811	1	160	160

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				160

Electronic Acknowledgement Receipt

EFS ID:	40878308
Application Number:	14712558
International Application Number:	
Confirmation Number:	1934
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Susan Yee/Janine Heitland
Filer Authorized By:	Susan Yee
Attorney Docket Number:	4820.001US7
Receipt Date:	19-OCT-2020
Filing Date:	14-MAY-2015
Time Stamp:	13:45:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 160
RAM confirmation Number	E20200ID46308029
Deposit Account	190743
Authorized User	Janine Heitland
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		4820001US7COC.pdf	218303	yes	4
			9767f9486d1ca169e4a37748d4be25256a2ab58d		

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Request for Certificate of Correction		2	4	
	Transmittal Letter		1	1	

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30163	no	2
			d7a91581056bc29840f874ada8f830b92128d331		

Warnings:

Information:

Total Files Size (in bytes):	248466

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
CERTIFICATE OF CORRECTION

PATENT NO. : 10,589,225 B2
APPLICATION NO. : 14/712558
DATED : March 17, 2020
INVENTOR(S) : Olson et al.

Page 1 of 2

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

In "Related U.S. Application Data", in Column 1, Line 1, delete "(60)" and insert --(63)-- therefor

On page 3, in Column 2, under "Other Publications", Line 19, delete ""CO2" and insert --CO₂-- therefor

On page 4, in Column 1, under "Other Publications", Line 55, delete "Jan. 15, 2010" and insert --Jul. 15, 2010-- therefor

On page 4, in Column 2, under "Other Publications", Line 39, delete "Actioin" and insert --Action-- therefor

On page 5, in Column 1, under "Other Publications", Line 12, delete "nanocornposites"," and insert --nanocomposites"-- therefor

On page 5, in Column 1, under "Other Publications", Line 20, delete "Poipyrrrole" and insert --Polypyrrole-- therefor

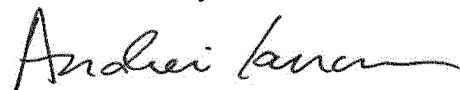
On page 5, in Column 1, under "Other Publications", Line 28, delete "Nanocornposites" and insert --Nanocomposites-- therefor

On page 5, in Column 1, under "Other Publications", Line 32, delete "nanocornposite" and insert --nanocomposite-- therefor

On page 5, in Column 1, under "Other Publications", Line 56, delete "chernistry"," and insert --chemistry"-- therefor

On page 5, in Column 1, under "Other Publications", Line 58, delete "SiO2-TiO2" and insert --SiO₂-TiO₂-- therefor

Signed and Sealed this
Seventeenth Day of November, 2020



Andrei Iancu
Director of the United States Patent and Trademark Office

CERTIFICATE OF CORRECTION (continued)
U.S. Pat. No. 10,589,225 B2

Page 2 of 2

On page 5, in Column 2, under “Other Publications”, Line 31, delete ““Effectsof” and insert --“Effects of-- therefor

On page 5, in Column 2, under “Other Publications”, Line 32, delete “Reducton” and insert --Reduction-- therefor

On page 6, in Column 2, under “Other Publications”, Line 48, delete “Reponse” and insert --Response-- therefor

On page 7, in Column 1, under “Other Publications”, Line 1, delete “perforance” and insert --performance-- therefor

On page 7, in Column 1, under “Other Publications”, Line 7, delete “Caol” and insert --Coal-- therefor

On page 7, in Column 1, under “Other Publications”, Line 12, delete “CO2” and insert --CO₂-- therefor

In the Drawings

Sheet 6 of 10, Fig. 6, delete “O2” and insert --O₂-- therefor

In the Claims

In Column 23, Lines 66-67, in Claim 1, delete “mercury-containing,” and insert --mercury-containing-
- therefor