

PATENT ASSIGNMENT

Electronic Version v1.1

Stylesheet Version v1.1

SUBMISSION TYPE:	CORRECTIVE ASSIGNMENT										
NATURE OF CONVEYANCE:	Corrective Assignment to correct the correct title previously recorded on Reel 024334 Frame 0075. Assignor(s) hereby confirms the title should be GAS LIQUID CONTACTOR AND METHOD THEREOF.										
CONVEYING PARTY DATA											
<table border="1"><thead><tr><th>Name</th><th>Execution Date</th></tr></thead><tbody><tr><td>David Kurt Neumann</td><td>11/05/2009</td></tr><tr><td>Keith R. Hobbs</td><td>11/06/2009</td></tr><tr><td>Jeffrey L. Courtright</td><td>11/06/2009</td></tr></tbody></table>		Name	Execution Date	David Kurt Neumann	11/05/2009	Keith R. Hobbs	11/06/2009	Jeffrey L. Courtright	11/06/2009		
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David Kurt Neumann	11/05/2009										
Keith R. Hobbs	11/06/2009										
Jeffrey L. Courtright	11/06/2009										
RECEIVING PARTY DATA											
<table border="1"><tr><td>Name:</td><td>Neumann Systems Group, Inc.</td></tr><tr><td>Street Address:</td><td>890 Elkton Drive, Suite 101</td></tr><tr><td>City:</td><td>Colorado Springs</td></tr><tr><td>State/Country:</td><td>COLORADO</td></tr><tr><td>Postal Code:</td><td>80907</td></tr></table>		Name:	Neumann Systems Group, Inc.	Street Address:	890 Elkton Drive, Suite 101	City:	Colorado Springs	State/Country:	COLORADO	Postal Code:	80907
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PROPERTY NUMBERS Total: 1											
<table border="1"><thead><tr><th>Property Type</th><th>Number</th></tr></thead><tbody><tr><td>Application Number:</td><td>12586806</td></tr></tbody></table>		Property Type	Number	Application Number:	12586806						
Property Type	Number										
Application Number:	12586806										
CORRESPONDENCE DATA											
Fax Number: (303)899-7333 <i>Correspondence will be sent via US Mail when the fax attempt is unsuccessful.</i>											
Phone: 719-448-5947											
Email: julie.lange@hoganlovells.com											
Correspondent Name: Hogan Lovells US LLP											
Address Line 1: One Tabor Center											
Address Line 2: 1200 17th Street, Suite 1500											
Address Line 4: Denver, COLORADO 80202											
ATTORNEY DOCKET NUMBER:	NSG007 CIP										
NAME OF SUBMITTER:	Scott J. Hawranek										

CH \$40.00 12586806

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PATENT
REEL: 024591 FRAME: 0531

Total Attachments: 10

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RECORDATION FORM COVER SHEET

OMB No. 0651-0027 (exp. 03/31/2009)

PATENTS ONLY

To the Director of the U.S. Patent and Trademark Office: Please record the attached documents or the new address(es) below.

1. Name of conveying party(ies):

David Kurt Neumann - Execution Date: 11/05/2009
 Keith R. Hobbs - Execution Date: 11/06/2009
 Jeffrey L. Courtright - Execution Date: 11/06/2009

Name and address of receiving party(ies)

Neumann Systems Group, Inc.
 890 Elkton Drive, Suite 101
 Colorado Springs, CO 80907

Additional name(s) & address(es) attached? ☐ Yes ☒ NoAdditional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3. Nature of conveyance/Execution Date(s):

- ☐ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Joint Research Agreement
☐ Government Interest Assignment
☐ Executive Order 9424, Confirmatory License
☒ Other Correct Notice of Recordation Cover Sheet

4. Application or patent number(s):

☐ This document is being filed together with a new application.

If this document is being filed together with a new application, the execution date of the application is:

A. Patent Application No.(s) 12/586,806

B. Patent No.(s)

Attorney Docket No.: NSG007 CIPAdditional numbers attached? ☐ Yes ☒ No

5. Name and Address of party to whom correspondence concerning document should be mailed:

Name: Scott J. Hawranek
 Internal Address: Hogan Lovells US LLP
One Tabor Center
1200 17th Street, Suite 1500
 Street Address: same as above
 City: Denver State: CO Zip: 80202
 Phone Number: 719-448-5909
 Fax Number: 719-448-5922
 Email Address: PatentColorado@hhlaw.com

6. Total number of applications and patents involved: 17. Total fee (37 CFR 1.21(h) & 3.41)..... \$.00

- ☒ Authorized to be charged to deposit account
☐ Enclosed
☐ None required (government interest not affecting title)

8. Deposit Account Number:

50-1123

Authorized User Name:

9. Signature:

Signature

Date

Scott J. Hawranek
 Name of Person signing

Total number of pages including cover sheet, attachments, and documents: 10

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: David Kurt
Neumann; Keith R. Hobbs; Jeffrey L. Courtright
Serial No. 12/586,806
Filed: September 28, 2009
For: GAS LIQUID CONTACTOR AND
METHOD THEREOF

Examiner: Not Yet Assigned
Art Unit: 2828
Confirmation No. 5215
Customer No. **25235**

REQUEST TO CORRECT NOTICE OF RECORDATION OF ASSIGNMENT

Mail Stop Assignment Recordation Services
Director of the U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, VA 1450-22313

Sir or Madam:

The Notice of Recordation of Assignment for the above patent contains a typographical error in the title. A copy of the Notice of Recordation, the Recordation Form Cover Sheet, Assignment, and first page of the specification which shows the correct title, are enclosed.

The title should be: GAS LIQUID CONTACTOR AND METHOD THEREOF

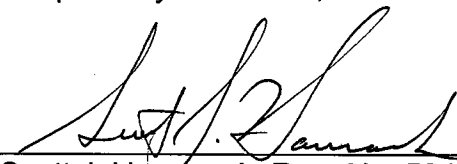
Please correct the title on the Notice of Recordation of Assignment.

No fee is believed due for this submittal. However, any fee deficiency associated with this submittal may be charged to Deposit Account No. 50-1123.

Respectfully submitted,

6/23/10

Date



Scott J. Hawranek, Reg. No. 52411
Hogan Lovells US L.L.P.
1200 Seventeenth Street, Suite 1500
Denver, CO 80202
Telephone: (719) 448-5920
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE



501166636A

MAY 04, 2010

PTAS

HOGANLOVELLS US LLP
ONE TABOR CENTER, SUITE 1500
1200 SEVENTEENTH ST
DENVER, CO 80202

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 571-272-3350. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, MAIL STOP: ASSIGNMENT SERVICES BRANCH, P.O. BOX 1450, ALEXANDRIA, VA 22313.

RECORDATION DATE: 05/04/2010

REEL/FRAME: 024334/0075
NUMBER OF PAGES: 6

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).
DOCKET NUMBER: NSG007 CIP

ASSIGNOR:
NEUMANN, DAVID KURT

DOC DATE: 11/05/2009

ASSIGNOR:
HOBBS, KEITH R.

DOC DATE: 11/06/2009

ASSIGNOR:
COURTRIGHT, JEFFREY L.

DOC DATE: 11/06/2009

ASSIGNEE:
NEUMANN SYSTEMS GROUP, INC.
890 ELKTON DRIVE, SUITE 101
COLORADO SPRINGS, COLORADO 80907

SERIAL NUMBER: 12586806
PATENT NUMBER:
TITLE: LIQUID CONTACTOR AND METHOD THEREOF

FILING DATE: 09/28/2009
ISSUE DATE:

^
GAS

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

PATENT
REEL: 024591 FRAME: 0535

024334/0075 PAGE 2

ASSIGNMENT SERVICES BRANCH
PUBLIC RECORDS DIVISION

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501166636

SUBMISSION TYPE:

NEW ASSIGNMENT

NATURE OF CONVEYANCE:

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Name	Execution Date
David Kurt Neumann	11/05/2009
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Address Line 4: DENVER, COLORADO 80202

ATTORNEY DOCKET NUMBER:

NSG007 CIP

NAME OF SUBMITTER:

Scott J. Hawranek

Total Attachments: 4
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ASSIGNMENT

WHEREAS, we, David Kurt Neumann, having a residence address of 14230 Timberedge Lane, Colorado Springs, CO. 80921, Keith R. Hobbs, having a residence address of 5927 Poudre Way, Colorado Springs, CO. 80923, and Jeffrey L. Courtright, having a residence address of 3679 Summer Breeze Drive, Colorado Springs, CO 80918, have made a certain new and useful invention relating to a GAS LIQUID CONTACTOR AND METHOD THEREOF, for which we are making or we have made application for Letters Patent of the United States, said application being identified by Docket No. NSG007 CIP and Client/Matter No. 33422.0015, in the law firm of HOGAN & HARTSON LLP, One Tabor Center, 1200 17th Street, Suite 1500, Denver, Colorado 80202, and which was filed on September 28, 2009, assigned serial no. 12/586,806 and

WHEREAS, we now own the entire right, title and interest therein; and

WHEREAS, Neumann Systems Group, Inc., hereinafter ASSIGNEE, a Colorado corporation, whose mailing address is 890 Elkton Drive, Suite 101, Colorado Springs, CO 80907, is desirous of acquiring the entire interest in and to said invention, said application, and the Letters Patent to be obtained therefor;

NOW THEREFORE, upon consideration of our employment and other good and valuable consideration, the adequacy of which is hereby acknowledged, we do hereby sell and assign unto ASSIGNEE, and ASSIGNEE's legal representatives, successors, and assigns, the entire right, title, and interest in and to said invention, said application, and the Letters Patent, both of the United States and of other countries, that may or shall issue thereon; and we do hereby authorize and request the Commissioner of Patents and Trademarks to issue said Letters Patent to ASSIGNEE, consistent with the terms of this Assignment.

UPON SAID CONSIDERATION, we do hereby covenant and agree with ASSIGNEE that we will not execute any writing or do any act whatsoever conflicting with this assignment, and that we will, at any time upon request, without further or additional consideration, but at the expense of ASSIGNEE, execute such additional assignments and other writings and do such additional acts as ASSIGNEE may deem necessary or desirable to perfect the ASSIGNEE's enjoyment of this grant, and render all necessary assistance in applying for and

obtaining original, continuation, continuation-in-part, divisional, reexamined, renewal, reissued or extended Letters Patent of the United States, or of other countries, or inventor's certificates, on said invention, and in enforcing any rights or causes in action accruing as a result of such applications, certificates, or patents, by giving testimony in any proceedings or transactions involving such applications, certificates, or patents, and by executing preliminary statements and other affidavits, it being understood that the foregoing covenant and agreement shall bind, and inure to the benefit of, the assigns and legal representatives of both parties.

The undersigned inventors hereby grant the patent practitioners associated with Customer No. 25235 the power to insert in this assignment any further identification that may be necessary or desirable in order to comply with the rules of the United States Patent and Trademark Office for recordation of this document.

IN WITNESS WHEREOF, we have hereunto set our hands and affixed our seals on the date hereinafter set forth.

Date: 11/5/09

David Kurt Neumann

David Kurt Neumann

STATE OF COLORADO)

)

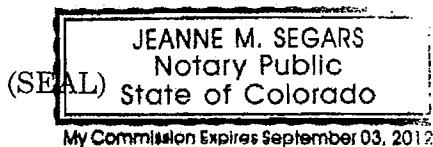
ss.

COUNTY OF El Paso)

On this 5th day of November, 2009, before me, a notary public in and for said county, appeared David Kurt Neumann, who is personally known to me to be the same person whose name is subscribed to the foregoing instrument, and acknowledged that he signed, sealed, and delivered the same instrument as a free and voluntary act for the uses and purposes therein set forth.

My commission expires Sept. 03, 2012.

Witness my hand and official seal.



Jeanne M. Segars
Notary Public

Date: 6 Nov 09

Keith R Hobbs
Keith R. Hobbs

STATE OF COLORADO)

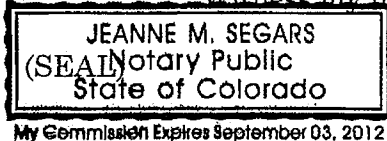
) ss.

COUNTY OF El Paso)

On this 6th day of November, 2009, before me, a notary public in and for said county, appeared Keith R. Hobbs, who is personally known to me to be the same person whose name is subscribed to the foregoing instrument, and acknowledged that he signed, sealed, and delivered the same instrument as a free and voluntary act for the uses and purposes therein set forth.

My commission expires Sept 03, 2012.

Witness my hand and official seal.



Jeanne M. Segars
Notary Public

Date: 6 Nov 09

Jeffrey L. Courtright
Jeffrey L. Courtright

STATE OF COLORADO)

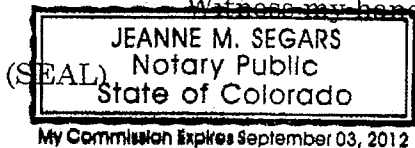
) ss.

COUNTY OF El Paso)

On this 6th day of November, 2009, before me, a notary public in and for said county, appeared Jeffrey L. Courtright, who is personally known to me to be the same person whose name is subscribed to the foregoing instrument, and acknowledged that he signed, sealed, and delivered the same instrument as a free and voluntary act for the uses and purposes therein set forth.

My commission expires Sept 03, 2012.

Witness my hand and official seal.



Jeanne M. Segars
Notary Public

GAS LIQUID CONTACTOR AND METHOD THEREOF

[0001] This application is a continuation-in-part of U.S. Patent Application No. 12/459,685, entitled "Gas Liquid Contactor and Effluent Cleaning System and Method," filed on July 6, 2009, which is a continuation-in-part of U.S. Patent Application No. 12/012,568, entitled "Two Phase Reactor," filed on February 4, 2008, which is a continuation of U.S. Patent Application No. 11/057,539, entitled "Two Phase Reactor," filed on February 14, 2005, now Patent No. 7,379,487; this application also claims the benefit of U.S. Provisional Application No. 61/100,564, entitled "System for Gaseous Pollutant Removal," filed on September 26, 2008, U.S. Provisional Application No. 61/100,606, entitled "Liquid-Gas Contactor System and Method," filed on September 26, 2008, and U.S. Provisional Application No. 61/100,591, entitled "Liquid-Gas Contactor and Effluent Cleaning System and Method," filed on September 26, 2008; all of which are herein incorporated by reference as if set forth in their entireties.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The invention relates to a gas liquid contactor and effluent cleaning system and method and more particularly to an array of nozzles configured to produce uniformly spaced flat liquid jets shaped to minimize disruption from a gas flow and maximize gas flow and liquid flow interactions while rapidly replenishing the liquid.

Discussion of the Related Art

[0003] The absorption of a gas into a liquid is a key process step in a variety of gas liquid contacting systems. Gas liquid contactors, also known as gas liquid reactors, can be classified into surface and volume reactors where the interfacial surface area between the two phases is created at the liquid surface and within the bulk liquid, respectively. There are many examples of surface gas liquid reactors such as rotating disks and liquid jet contactors. Rotating disk generators are disks (rotors) partially immersed in a liquid and exposed to a stream of gas. A thin film of liquid solution is formed on the rotor surface and is in contact with a co-current reagent gas stream. The